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THE NATIONAL GEOGRAPHIC MAGAZINE

THE CHARACTER OF OUR IMMIGRATION, PAST AND PRESENT*

By Z. F. McSweeny

Formerly Assistant Commissioner of Immigration

THE subject of our immigration is perhaps the most discussed and least understood public question now before the people. On one side we find a portion of our citizens claiming that all kinds of economic and social evils are to be attributed to immigration. The supporters of the other side are equally positive that the nation's growth and progress are due to these alien races. The arguments pro and con are generally made to prove a special case, and as such are not always to be relied on. On one thing both will agree, that for the poor of Europe, America spells "opportunity." Previous to the past five decades of emigration the world has never witnessed such prodigious achievements, such wonderful enterprise and real progress in all the things that contribute to make a nation great.

WORLD MIGRATIONS

The causes of migration have been manifold. Now it was famine, again the taste for conquest, that caused a people to take up its household goods and push out into unknown lands. Ambition fired the soul of one; religious persecution or political revolutions inflamed another; while the love of gold was always a potent factor.

"Emigration" and "immigration," as we understand them, are phenomena of modern life. In prehistoric and historic times, up to the discovery of America, men moved in tribes and on careers that were chiefly of conquest. In vain do we seek, in these migrations, for any parallel to the influx that is now pouring upon us.

A new kind of migration began with the discovery of America and the new route to India around the Cape of Good Hope, and may be called "colonization." Those who took part in this movement utilized the newly discovered countries, first, merely for the purpose of booty; afterward for the establishment of trading posts.

The beginning of this century disclosed a movement far different from either of these; it is not a national, but a private one. The citizens of other states come here, not in conquering hosts, but as individuals—to a nation for the most part foreign to the one they left, in customs, in manners, and in government. In a word, the migrations of the nineteenth century were not conquest or colonization, but "emigration."

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*An address to the National Geographic Society.

Long before history began to be recorded, multitudes of people went out from Central Asia. There the Aryan race—the most important of the human family—had its rise. But the population soon outgrew the means of subsistence. Migration became a necessity. The Celts first spread over Europe; then came the Teutons. Of the Semitic branch of the Aryan race the Jews particularly wandered far and wide. First, to Egypt they went; then, through the wilderness to Canaan; subsequently, in the various captivities to Babylon.

Greek colonists formed from the beginning an organized political body. Their first care, upon settling in a strange land, was to found a city, and to erect in it those public buildings that were essential to the social and the religious life of a Greek. The spot was usually seized by force and the inhabitants enslaved. This sort of migration aided the fatherland and bettered the condition of the people taking part in it, for the migrants often made rapid progress in their new abodes, and added more arms to the strength of the mother country.

No voluntary migrant ever left Rome; the colonies she sent forth were intended to bridle subjugated provinces, and, as a writer well said, "should be regarded rather as the outposts of an immense army, the headquarters of which were at Rome, than as an establishment of individuals who had bidden 'adieu' to their mother-country and intended to maintain themselves in their new country by their own industry."

Yet they were of advantage to the empire, for they strengthened her power abroad, and alleviated the distress at home by removing from the city a large number of the excessive population; but that policy did not result in as permanent improvement as was anticipated, for the city population increased in numbers more rapidly than the surplus could be absorbed by the foundation of new colonies.

A great wave in the migration of nations was that which swept over Europe and buried forever, under its onward rush, the old Roman Empire with its civilization. Out of this conquest grew chaos at first, then slowly new states began to rise upon its ruins, which were finally united in the Holy Roman Empire of the German nation. There were attempts, first by the Turks and later by the Arabs, to better their conditions by an invasion of Europe; but they were driven back by the sturdy Crusaders, and with their driving back was rung down the curtain on that gigantic drama known as "Migration of Nations"—closed perhaps forever.

Modern migration dates from the discovery of America, though it was not for centuries later that it assumed any great proportions. Europeans came in large numbers; they were merchants, workers, and planters. The natives furnished the labor. The value of the colonies to the mother country was no longer merely "military;" it was "commercial." The planters received their capital from the home country and disposed of their products and made their purchases there. Their intention was to build up a country that would be self-supporting and enjoy the same civilization as the mother country. At the same time they did not separate themselves from the parent, but continued under her political control. The relations between the two countries were for the most part friendly and loyal. They were still "Frenchmen" or "Englishmen" or "Dutch," as they had been at home. The title of "American" was yet to come. It is not too much to say that the migrations of these centuries, from the fifteenth to the nineteenth, changed the whole aspect of the world. We can scarcely picture to ourselves the limitations of medieval life confined within the bounds of western Europe. This colonization established world commerce and brought the products of the whole earth to the inhabitants of Europe; it magnified the scale of things ten-fold. It did more; it changed the relative position of nationalities; it made the English race and speech dominant throughout the world.

EARLY AMERICAN IMMIGRATION

But with the Declaration of American Independence a new movement in the history of changes in peoples became evident. It has since then grown in intensity almost every year, until it has become an important phenomenon of social life. It is not to be judged by any of the previous migratory efforts; it must rather be considered on its own basis and with respect to its influence on the civilization of modern Europe.

The Pilgrim fathers, fleeing to New England because of religious and political persecution, were the first real colonial settlers of America. It was real love of liberty and freedom that brought them, and not the visions of Indian wealth or mines of gold and fisheries of pearl, with which the Spanish adventurers in Peru and Mexico had astonished Europe, but the desire to worship God in their own way and to open an asylum to all victims of oppression throughout the entire world.

At the same time emigrants from Holland had commenced the settlement of Manhattan Island, and English settlers came to the western part of Long Island.

Contemporaneously, Gustavus Adolphus—at war with the Catholic powers—wished to found a new Sweden in America, which would be devoted to the uplifting of the Lutheran religion, and he sent a colony of Swedes to the Delaware.

Peter Stuyvesant, when he was governor of New Netherlands, became involved in difficulties with the New England colonies, and also with those Swedish settlers on the Delaware; and while he failed in his attempt to get the New England colonies under the Dutch rule, he did succeed in defeating the Swedes, who accepted Dutch sovereignty.

Religious toleration was the rule, and Bohemian, English, French, Germans, Italians, and Swiss were induced to come to the new colony.

Another colony of great importance to the country was that founded by Lord Baltimore in Maryland. This colony was Catholic, but the principle of religious freedom, which has since become a part of our national life, was first inaugurated in this territory.

French Huguenots, coming here after the edict of Nantes, formed an important settlement in the south.

The Quakers, who came to the United States in the latter part of the 17th century, by the straightforwardness of their dealings with the Indians, did much to supplement the civilizing influence that was being carried on by the Jesuits in French Canada, to whom no little credit is due. Without regard to their personal comfort or safety, these priests instituted a missionary work among the Hurons, Iroquois, and Algonquins, which lasted until the annihilation of the Huron tribe. They entered into the daily life of the Indians, and it required years of good example to make the slightest impression. Their sufferings and martyrdom are incredible; but as fast as one was massacred another was sent to take his place, and the recognition of the Puritan governor of New England in inviting Jesuit missionaries to be his guests and the guests of the colony is the best proof that these Protestants were convinced of the excellence and far-reaching influence of these Canadian priests. Their humanizing influence was felt forever afterward. The Indians came to know that they could depend upon the word of these missionaries and the Quakers, which made their subsequent dealings with all white men more peaceful.

Not the least important of the alien forces that combined to make the colonial history of this country were the thousands of Irish, who were sent to England after the time of Cromwell, compelled to give up their Irish names, and given such names as "Brown," "White," "Black," "Carpenter," "Shoemaker," etc., after they settled in Virginia and northward. It is stated—which fact seems to be borne out by the parliamentary discussions in England after the war of the Revolution—that one-third of the American soldiers in the Revolution were of Irish birth or descent.

This short history of the colonial settlement of the United States is necessary in order to emphasize the point that what we call "American character" is really a combination of the racial characteristics of the alien forces that came to the United States prior to the War of the Revolution. As President Roosevelt said in writing of New York city of 1775:

"New York's population was composed of various races, differing widely in blood, religion, and conditions of life. In fact, this diversity has always been the dominant note of New York. No sooner had one set of varying elements been fused together than another stream has been poured into the crucible."

In New York particularly this diversity of race is most noticeable. Baron Steuben was a Prussian; Hamilton was born among the West Indian Islands, of Scotch parents; Hoffman, the son of Swedish parents; Herkimer, a German; Jay, Dutch; Clinton, Irish; Schuyler, Hollander; Morris, Welsh. This amalgam of blood and diverse races has resulted in the acknowledged highest national character known to the civilized world, and the fusion of their ideas has had immense effect on the permanency of the institutions we now enjoy.

IMMIGRATION DURING NINETEENTH CENTURY

It is not necessary to go deeply into the story of immigration during the early part of the past century. It is interesting, pathetic, and in some of its details horrible. In the suburbs of Montreal is a stone with the inscription that it is "sacred to the memory of six thousand emigrants who died of ship fever in one year—1847." The conditions of immigration were then vastly different. Immigrants were subjected to treatment that would seem incredible now. Most of them could not pay their passage, and were sold on arrival by the shipping companies into temporary servitude as "indented servants." During the whole of the eighteenth century the prepayment of passage was the exception and subsequent slavery the rule. As a consequence old people would not sell well, and their children had to serve longer to make up for them. Whenever a ship arrived at New York or Philadelphia, the immigrants were put up at public sale. Families were separated forever. A master not wishing to keep his servant could transfer him to another. Parents sold their children for a period of years in order to become free themselves. The treatment of these poor creatures can be easily imagined. This state of affairs continued until 1819, when a law was passed compelling certain improvements and the manifesting of emigrants from 1820. Since this law went into effect the number of immigrants arriving yearly has practically been an almost infallible industrial barometer.

The variations in our immigration

represent the ups and downs of business and commercial prosperity. The business panics of 1837, '57, '73, and '93 are accurately recorded, taking about two years to make their influence felt. In short, although the chart on page 6 shows simply the number of immigrants who have come to the United States since we began to take immigration statistics, it is a most accurate financial history during that time.

The year 1881–'82 marks the climax of the older immigration and the beginning of the new. That from Ireland, which received its impetus from the horrible condition of their native land thirty-five years before, was still continuing with undiminished force. That from Germany reached in 1882 its maximum of 193,000. It, too, received its first impulse in 1847, in the depressed industrial conditions in which revolutions and political disturbances had left the country, but there is no special reason for a maximum during that year, unless it be a knowledge of the peculiar opportunities then offered by this country and the infectious example of others who were starting in this direction.

The Germans coming to the United States have been of different types. First, in the early part of the century, Pennsylvania Germans were hyper-orthodox Lutherans; in 1848, Free-Thinkers, followed by Roman Catholics and Social Democrats.

The Scandinavian, which completes the list of the distinctive elements of this older immigration, seems to have emigrated, not because of any serious political or industrial conditions like the others just mentioned, but because of the special inducements which this country offered him to pursue here the same vocations to which he was accustomed at home with the hope of greater rewards.

The horizon of the Germans, Irish, and Scandinavians was filled with the one radiant idea of making for themselves a home in this country, and of becoming in the highest sense American citizens.

Such an immigration as that of 1882 represents the natural increase of a population of about 50,000,000 people. In other words, we had then a foreign population almost equal to our own, contributing to our growth by its natural increase.

To the ordinary person living outside the great cities, the designation "immigrant" brings to mind the Irish, Germans, or Scandinavians—the people just mentioned—who, even up to 1885, constituted such an overwhelming majority of the total arrivals at our ports. They may still be seen everywhere—in the manufacturing trades or as shopkeepers, household servants, merchants, and professional men. They have bettered their condition in life and added to the general prosperity of the country as well.

Seeing them on all sides, the uninformed observer fails to realize that their compatriots are no longer coming, but in their stead are new forces—Mediterranean, Oriental, and Slavic races—whose predominance in numbers at present is absolute.

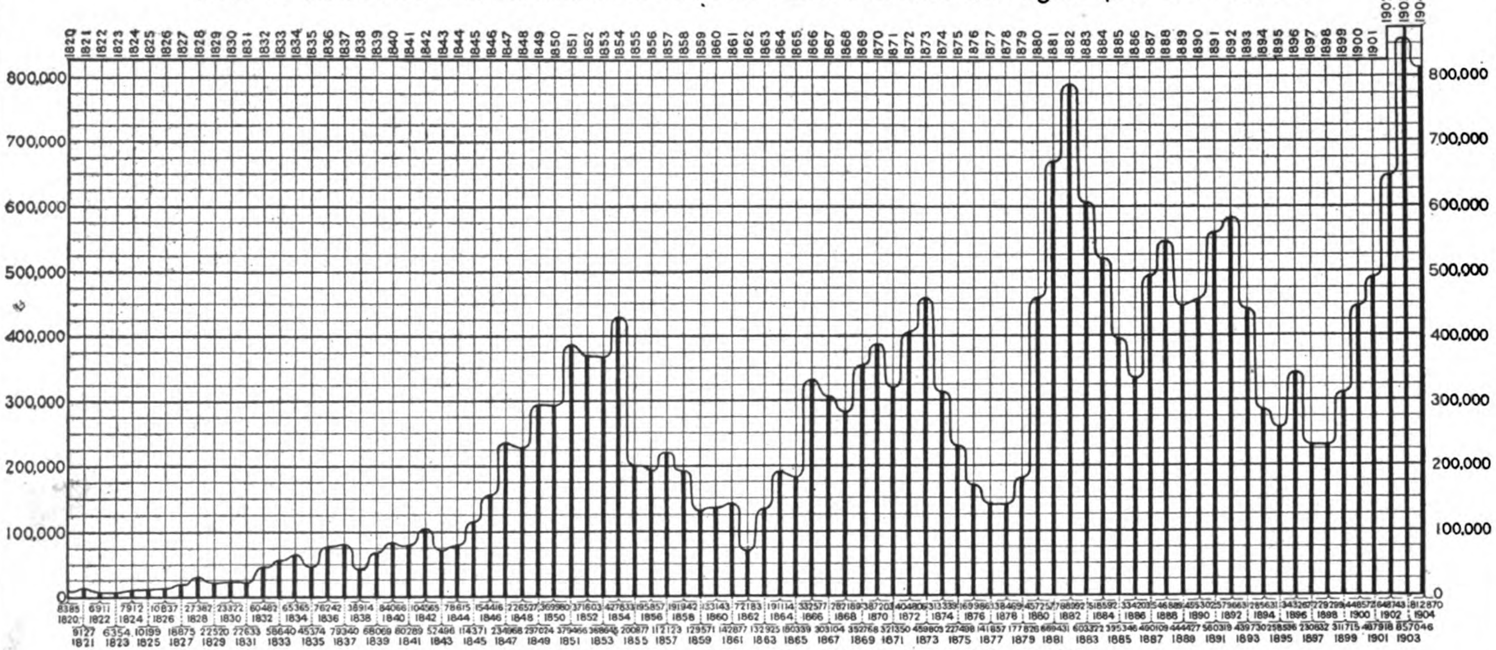
The Carpathian and Baltic Mountains are nearer the mining districts of Pennsylvania today than Boston was 50 years ago.

IMMIGRANTS FROM ITALY, AUSTRIA-HUNGARY, AND RUSSIA

In 1882 a circle drawn over the map of Europe, taking in all points from which we were receiving immigrants, would have its center in the city of Paris. In 1902 a circle of the same size, including the source of the present immigration to the United States, would have its center located in Constantinople.

In classifying immigration, the Immigration Bureau relies in the main upon differences in language. Let us now attempt to briefly note their more marked

WAVE OF IMMIGRATION into the United States, FROM ALL COUNTRIES, during the past 85 YEARS.



ARRIVALS 1820 TO 1904, 21,905,684. ESTIMATED ARRIVALS 1776 TO 1820, 250,000.

From the Report for 1904 of Frank P. Sargent, Commissioner General of Immigration racial characteristics and the motives which actuate their coming.

From Italy, Austria, and Russia, in the order named, we are receiving the present immigration.

Italy encourages emigration and derives much benefit therefrom.

The economic conditions of Austro-Hungary are such that there is every inducement for the peasant class to seek the prosperity which this country offers.

Attempts have been made to provide employment by large appropriations for state railroads and canáls, but without apparent effect. Seen from this side, there seems to be an unceasing war between Bohemian and German, Croat, Pole, and Hungarian, which permanently threatens the nation's progress, while parliamentary efforts seem to be limited to the playful exchange of inkpots, rules, and cuspidors between opposing factions.

The real Russian never comes to the United States, except an occasional student or business man. The government's policy is to encourage those racial elements who do not accept the national religion and customs to leave, and keep the others at home. There are at least 50 well-defined races in Russia, each with a different language. It is not necessary to do more here than to call attention to the mighty strides with which Russia is pushing to the front in commerce and modern methods. Like England and Germany, this country will use every effort to keep those of its citizens who will fight within the jurisdiction of its flag.

First of all racially, in numerical importance in the year just passed, stand the Italians, with 196,208 arrivals—159,329 being southern Italians, according to our classification, and coming from Sicily and that portion of Italy south of Rome.

This part of Italy was already represented in the immigration twenty years ago, but was composed chiefly of artisans, barbers, restaurant keepers, fruit venders, etc. Now the majority of Italian immigrants enter the field of unskilled labor.

A people who have contributed a share at least toward bringing an undivided country out of the turmoil of 2,000 years of European wars and politics deserve the right to be regarded favorably in a consideration of their ultimate influence upon the national life of their adopted land.

The Italians come here to work and they do work, and their potentiality for improvement and progress is remarkable, and while they are "birds of passage," this tendency is lessening year by year. The objection to this race is in its adherence to the idea that they are colonists of the mother land, and while here, subject to her authority. The "La Colona" idea makes the assimilation of the Italian much more difficult.

Our history shows that while our early colonial settlers were dependent upon their government entirely for support, they were a motley set of shiftless adventurers. Left to themselves, they became brave and daring pioneers.

The northern Italian is a type which belongs to the older period of immigration, and has little to differentiate him in economic possibilities from the Swiss, French, or Germans. It is interesting to note, however, that the Italian anarchist is the product of northern, rather than of southern, Italy.

Next in numerical importance stand the Hebrews, with 106,236, who, with the exception of a few hundred, belong to that branch of the Hebrew race which for centuries has found its home in Russia, Austria, and Roumania. A Hebrew element has existed in our population from its earliest history. The immigration of this particular branch, however, dates back scarcely twenty years, and is distinctive from the fact that it has been largely artificial and assisted from the start. They come to stay, to cast their lot with us for weal or woe. They come in response to no demand for that which they can bring, and are unfitted by lack of physical development to enter the general industrial field. They bring with them, however, intellects which are the products of thousands of years of mental training and sharpened by exercise among hostile surroundings. A Jew has his face turned toward the future, and, by virtue of the tremendous power of his religion, has been able to impress himself as a living force in every country in the world except China. Coming to England ten years before they came here, the same industrial problems of crowding in certain trades and working in sweat shops were manifested, but there, as here, they have by organization been able to practically free themselves. In New York today in the sweating trades alone the Jew has been pushed upward by the Italians, and they in turn are being uplifted by the Armenian and Syrian coming into this industrial field.

The Polish immigration now amounts, in round numbers, to about 67,000 per year, equally divided between Russia and Galicia, with about one thousand from the Polish provinces of Germany.

The woes of Poland have aroused world-wide sympathy for a hundred years. In the past its political disturbances have given rise to an immigration largely taking on the character of exile. For thirty years the objections to Russia's policy in its Polish provinces have been more sentimental than practical, and Polish immigration in its modern sense is due not to persecution at home, but rather to the discovery of a profitable field for employment here for laborers of the peasant class. More, perhaps, than any other element in this later immigration, except the Hebrew, it comes here to stay. As we see them they are illiterate, strongly religious, and moderately ambitious to become citizens. In Buffalo, or instance, where they have a large settlement, they are buying homes, and their mortgages are regarded as the most desirable sort of investment.

We are now receiving every year close upon 30,000 Slovaks, from the mountainous regions of northern Hungary—a Slavish people, speaking a tongue akin to the Bohemian, living in their own lands in mud huts without chimneys.

They, too, are extremely illiterate, and turbulent under leadership. These people have, nevertheless, a strong instinct of sincerity and honesty and a higher degree of personal self-reliance than most branches of the Slavish race. They can call up no past record of prominence in the milder arts, but point with pride to a language and territorial boundary which has remained intact through centuries of attempted foreign aggression. Sturdy, robust, and inured to hardships, they have no difficulty in finding a place in our industrial system. They exhibit a strong and apparently increasing tendency to return to their Hungarian mountain sides, and have as yet given little indication of the direction in which their future influence upon this nation will lie.

The fertile country of central Hungary furnishes no emigrants, but further north, in the districts less favored by nature, there is an emigration of Magyars amounting to about 23,000 a year. They are evidently induced by the example of the Slovaks, whom they resemble in every way except language, the former being of Slavish and the latter of Turanian origin. The same similarity continues here—both seek the same general localities and enter the same field of labor as the Poles and Lithuanians.

The Croatians and Slovenians, from the south of Austria, have only commenced to come to this country in the last 15 years, and have already colonies in southern California and Oregon, with large numbers in the Pennsylvania mines.

From Carnolia, Krainers have been coming here for 70 years, following some Krainer missionaries who came here and settled on the northwestern border. These missionaries have been followed by their countrymen, who have formed settlements. They are in most respects a desirable people, and come here to remain, and are rapidly becoming citizens.

Dalmatian settlements are rapidly forming in the United States, especially in the more growing sections of California.

The whole Balkan territory is beginning to feel the fever of emigration, and only the prohibitive rates for passage keep the semi-civilized tribes of Bosnia, Servia, Herzgovinia, and Bulgaria from coming here. In the near future cheap river transportation will be provided on the Danube River to the Black Sea, whence they can come to the United States. Then we may expect them in large numbers.

THE FINNS

Up to 1899 the Finlanders had lived contentedly enough under Russian rule, and, on the whole, the Czars punctiliously observed their oath to maintain inviolate the constitutional liberties of Finland. In that year, however, the present Czar wiped out the Finnish constitution and promulgated a rescript that all questions held by the Russian ministers at St Petersburg to concern the Muscovite Empire of old should be treated by them and Finland put under the general conditions of other Russia. Prior to that time no enactment had the force of law unless it emanated from the Finnish Parliament. The protest on the part of Finland to this action was immediately responded to by almost every other civilized country in the world, but without avail. The press is muzzled, the right of public meetings prohibited, and private gatherings forcibly dispersed. In July, 1901, by special ukase, the Finnish military act of 1878 was abrogated and the army broken up. Those Finnish officers who did not choose to serve in Russian regiments were sent into private life.

When we consider that among the Finnish people it is stated that only one man in 1,200 cannot read nor write, while in Russia the illiteracy ranges from 47 to 66 per cent, according to districts, and Finnish customs, language, manners, religion, and ideals are all different, it seems that this movement will practically destroy the Finnish people. In 1899 we commenced to get what promised to be a considerable immigration from this territory, but the British government, alert to the advantage of securing such a desirable people, have, by reason of special inducements, diverted the Finns to Australia and other British colonies.

Greek immigration consists mainly of boys and young men, there being but one woman to thirty males. Some work in mills in Massachusetts, but the bulk are brought over to peddle fruit and peanuts, in which business they are displacing the Italians. It is generally understood that they are brought over by padrones and paid $100 per year for their services in peddling.

The Syrian immigration now amounts to over 3,000 yearly. The movement seemed to receive an impetus by the World's Fair of 1893. Like the Greek, they are mainly controlled by padrones. Though the movement is actually less than ten years old, Syrians are now trudging over the whole of the Western continents with their packs and baskets of gew-gaws. They are not only around the well-settled districts, but are actually among the remote fishing hamlets of Newfoundland and Gaspé, everywhere among the villages of Mexico, in Brazil, Argentina, and in Patagonia.

In character they have changed little since they were described in the Old Testament. They have all the vices of the oriental races, but without many of the virtues. They are the toughest problem that official and private charity has to meet in the communities in which they live.

CHINESE

Ever since the beginning of time there has been a constant struggle for assimilation between races, in which the absorbent quality of the United States has proven superior to that of every other nation in the world, with the single exception of the Chinese.

On the other hand, assimilation of the Chinese is impossible. Their fecundity and lack of interest in any other civilization but their own, their habits and customs and unwillingness to accept new ideas, offers no material to work on.

One of our best and clearest thinkers on this question claims that the danger from Chinese immigration is that, if allowed to come here unopposed, they will in time monopolize all industrial occupations, and the American people, both of native and alien descent, will shrink to a superior caste, who would temporarily hold their own in government, education, and culture, but would finally and hopelessly be displaced as a race, and American labor and American manhood would diminish and fade away before the influx of this inferior and prolific race from the Orient, as in classic times the Latin husbandman vanished before the endless number of slaves poured into Italy by triumphant generals.

One of the most interesting questions in connection with the Chinese is their climatic adaptability. While it is beyond question that the Northern races of Teutonic and Celtic descent are superior economically and militarily over all known races of the earth, in climates different from their own they are unable to compete with inferior races.

The Latin races—French, Spanish, Italian, and Portuguese—are much more successful in tropical settlements than the English or German; but the most remarkable adaptability to climatic conditions is manifested by the Chinese. They succeed in the far South, where the white man cannot live, and are successfully working in the North, where the mean temperature is below freezing.

The trouble with the Chinese is that they are 400 million strong. It is to the interest of the Chinese government to allow them to migrate to foreign lands. The history of Europe shows that the Jews have clung to racial characteristics with the utmost tenacity since they were driven out of Alexandria by Cyril. They have gone from one country to another; have been oppressed, and have absorbed the best traits of all with whom they came in contact. They have attained prominence in the business and financial markets the world over. Wherever they have gone they have always remained Jews—true to their religious and racial ideas. While they have been able to maintain their racial individuality in every other country, whole tribes have gone into China, and in the course of a hundred years have been completely absorbed.

No foreign influence has ever gone into China that has made the slightest impression on the Chinese race, and while they have been the migrant race of the world, they always remain Chinese. Their history in California, where 10 per cent are professional criminals, does not show any special reason for encouraging more to come.

OUR IGNORANCE OF THE PEOPLES BLENDING INTO THE "AMERICAN" RACE

For fifty years we have been getting alien emigrants, and most of our people have become accustomed to the sight of foreigners, but as a matter of fact they know very little about them—whence they come, their racial traits or habits.

I have spoken to high-school gatherings and teachers, and have been utterly amazed at the lack of knowledge of geography, and especially of racial geography, which is manifested throughout the United States.

If it is true that each incoming racial element leaves its indelible imprint on the character of the people of the United States, and that our national character has been built up from the diverse races that have come here, it would seem to be unquestioned that our educational methods should include the study of racial geography to equip students who are being turned out of our colleges with a knowledge of the races that are annually coming into the American life, and especially with their economic, moral, and social effect on the community. The National Geographic Society can well initiate this work by agitating for a more comprehensive and scientific study of racial geography in our various institutions of learning in the United States.

The Romans and the Greeks regarded all strangers as barbarians. Most savage tribes have no word to differentiate between these two terms.

This feeling, inherited through the ages, is at the bottom responsible for unthinking opposition to immigration, and unfortunately comes often from those who were themselves aliens but a short time before. As the proselyte becomes the most rabid opponent of his former religion, so the recently naturalized foreigner is often the loudest in his demands to close the doors to others.

Migration and the tendency of races to move from one place to another have been the strongest instincts in human nature. The counter-instinct, equally strong, of self-preservation has made the opposition of the resident races always to be considered. As the Greeks and Romans considered a stranger a barbarian and an enemy, so did the first colonial settlers of the United States regard later comers as a danger to them. As early as 1765, as told by Edward Eggleston, William Penn expressed himself as being apprehensive of the coming of the Pennsylvania Dutch to his colony. In 1819 and 1820, although the migration of that period was very small, the municipal authorities of New York expressed apprehension as to the effect on the public institutions of the 10,000 or 12,000 immigrants, the total number of the arrivals at that period.

In 1850 the Know-nothing movement was the direct result of the exodus of the Irish and Germans to the United States, which had begun in the 40's.

The discussion of the Kansas and other border states land acts in the 40's and 50's, concerning the question as to whether the aliens should have the privilege of occupying these lands on the same terms as the natives, brought forth expressions of opinion from Clay, Calhoun, and Seward, which were generally expressions of fear as to the economic effect on the United States of the introduction of these aliens.

Washington, Madison, and Jefferson, in the early life of the Republic, gave the question some attention, and were in turn either openly opposed to or doubtful as to the effect of the introduction of alien races.

The Civil War and the immediate response of the alien residents of the United States in enlisting to enter the armies of the North stopped emigration discussion for twenty years.

WHAT WILL BE THE EFFECT OF OUR UNCHECKED IMMIGRATION

During all the years that immigration inspection has been in progress no steps have been taken to scientifically ascertain the real danger or value to the United States of the immigrant forces coming to this country. The investigations of the Bureau of Labor have shown that the economic dangers that were feared in the early 50's have not been realized. Since 1870 wages have steadily risen, the conditions of employment have been improved, and the hours of labor reduced. The purchasing power of every dollar earned has been increased by 60 per cent, and this during the period of heaviest immigration. It would be unfair to claim that immigration had any influence in this connection; rather we should attribute it to the organization of labor; and, broadly speaking, labor organizations have been supported by and have found their best members among the immigrants. Whatever danger there may be is in the undue preponderance of criminals, insane, and those becoming public charges. There is no means of accurately determining how much damage has been done in this direction, or whether the undoubted beneficial effects, which have been demonstrated in a thousand directions, can be offset. Immigrants come here at the age when people are most liable to commit crimes. They are freed from moral restraint and all fear of loss of caste, which, even in the lowest order of society, is, next to religion, the strongest deterrent to crime. Some day we may hope to see both sides fairly weighed and an exact judgment rendered, which, with our defective sources of information, is not possible today.

When we consider this question it compels us to pause in wonder as to what its effect will be on the future of the American people. If, in spite of our institutions and forms of government, the alien races that have already come and are still coming can succeed in undermining our religious, political, and economic foundations, it will be because we willingly succumb, through inertia, to their influences. Rome, Babylon, and all the nations of the world that have fallen have done so because they abandoned their moral, religious, and social ideals, their decline in most cases being contemporaneous with the introduction of alien races. If such is to be the result in this country, it will simply be history repeating itself; but I have confidence enough in the morals and character of the American people to believe that the races introduced among us will take from us only that which is good, and through education we will give them stability and the power to become thoroughly assimilated.

The privilege of intercourse with native children and school instruction lifts up the immigrant in the second generation to the level of his fellows.

The children of the ignorant, illiterate, and once despised German and Irish have grown up to match the native American of several generations in brawn and brain, wit and culture, and are today working with them, side by side, in every line of social, scientific, intellectual, political, and mechanical endeavor.

This is easily understood when we watch the avidity with which foreign children embrace the educational advantages of our schools, and especially note their docility and amenability to discipline. They have a practical idea of the value of education and regard it as an asset to increase their earning capacity. During the past few years in New York the end of each school term shows that the Jewish children have obtained more honors than all the others put together.

CONTRACT-LABOR LAW

I have not the time to take up in detail the question of the violation of the alien contract-labor law by aliens, but it is a most important matter and is deserving of attention. For a number of years after its passage but little effort was made in the direction of its enforcement. Subsequently, after the service passed under federal control, a vigorous attempt was made to show results that afterward were found by the labor organizations to be worthless, cruel, and unnecessarily severe to the immigrants.

The alien contract-labor law, which was passed for the protection of the American workmen, to prevent the introduction of alien laborers to take the place of native labor on strike, is so well known in Europe that those desiring can violate this law with impunity, inasmuch as the only means of detecting such violations is the immigrant's own confession.

A system has grown up whereby aliens are brought to this country to work under contract, and the place of employment, the name of the employer, and all the essential facts which, if in the knowledge of the alien and admitted by him to the inspecting officer, might convict him are withheld from him until after his arrival here. This system, which has been in active operation for several years, is responsible for the open and flagrant violation of this law. The law needs to be strengthened; the real danger to the American workman, however, does not come from the aliens coming under contract, but from the class so well described in the President's annual message as "below a certain standard of economic fitness to enter our industrial fields as competitors with American labor."

There is more danger from a dozen aliens who are thrown on the streets of New York penniless and friendless, and compelled to take any situations that they can get, without regard to wages or conditions, or starve, than from double or treble the number of contract laborers.

The first means the lowering of all standards of living, and is beyond competition; the latter at its worst can be partially kept under control, even with our present defective laws and adverse court decisions.

The intending traveler is schooled to pass every question long before sailing, and when a new scheme to evade the law is discovered and provided against, it only takes about a month for the immigrant arriving to know all about the new regulation.

Anarchists and criminals are not boasting of their record before inspection, and while the proportion of immigrants who actually possess criminal records at home is comparatively small, those that have criminal proclivities constitute a larger proportion. Many of the former class, and most of the latter, will be able to evade any form of inspection that may be devised. Their undesirability can only be demonstrated by their careers after landing in this country. It is perfectly proper to adopt any measures to prevent the coming of such people. But however well such an inspection service be organized and conducted, it must, to accomplish to any extent the desired object, be supplemented by some provision for apprehending and deporting those who gain admission to the country from lack of evidence at the time of examination to show that they are not entitled to land.

THE EXAMINATION OF IMMIGRANTS

Immigration inspection, in the sense of sifting the desirable from the undesirable and deporting those not coming up to a certain standard, has only been in operation since 1890. Prior to 1857 incoming aliens landed at the docks In that year, mostly for health reasons, Castle Garden was opened as an immigrant landing station, continuing as such until 1890.

Secretary Windom in that year took the service under federal control and moved the station to the Barge Office in New York. The building of a new wooden station at Ellis Island caused the removal there in 1892; in 1897 this was burned down, necessitating again going to the Barge Office for over three years. The new immigrant buildings on Ellis Island are especially constructed for the work of receiving, examining, detaining, and giving medical attention to the incoming hosts, as many as 7,000 having arrived in one day.

We are fortunate in having associated with us a large number of earnest and hard-working missionaries, representing every race and religious denomination, whose constant presence not only brings comfort and help to the arriving alien, but also acts as a powerful protection against extortion or abuse of any character. Every year since coming under federal control the conditions surrounding the immigrant have improved, until today he is absolutely free from organized plunder.

In former days, as one of the state commissioners said in 1869, they were robbed and plundered from the day of their departure to the moment of their arrival at their new homes, by almost every one with whom they came in contact. They were treated worse than beasts and less cared for than slaves, who, whatever their condition may be in other respects, represented a smaller or larger amount of capital, and as valuable chattels received from the owners some help and protection.

There seemed to be a secret league, a tacit conspiracy on the part of all parties dealing with immigrants, to fleece and pluck them without mercy, and hand them from hand to hand as long as anything could be made out of them. The thousands who died from ill treatment on the voyage were thrown into the ocean with as little ceremony as old sacks or broken tools. If crosses and tombstones could be erected on the water as on the western deserts, the routes of the immigrant vessels from Europe to America would long since have assumed the appearance of crowded cemeteries.

While every means is employed by the federal government to provide precautionary measures, petty extortion from immigrants will exist as long as credulity and ignorance exist on one side and human depravity on the other; but I can confidently assert that every legitimate means, almost amounting to paternalism, is exercised by the immigration service to give the arriving immigrant that first impression of our laws and form of government that will place him on the road to good citizenship, while at the same time strictly carrying out the present defective laws.

In every other kind of function which comes within the purview of government officials, the thing to be dealt with is merchandise or finances, while in the immigration service we have to deal with people. No two persons will look alike, nor can any rule be established that will make human beings equal; therefore the result of inspection must depend, in a large measure, on the discretion of the examining official. The best law in the world, with poor officials, would be of little protection to the country, while the present law, insufficient as it is in many respects, has done wonders in keeping out undesirables. Immigration inspection should be considered just as much a patriotic duty as is fighting for the honor of the flag.

By our present system of selection, the officers charged with this delicate, responsible, and most important duty are chosen for their positions under the same methods and with the same test as would be applied to men whose duty is to weigh coal, merchandise, or add up accounts. Under the present conditions, the authority to pass immigrants is mainly in the control of the officers who were originally appointed, not because of their zeal or sympathy with the spirit which prompted immigration legislation, but because they had knowledge of foreign languages, which enabled them to converse with the incoming aliens. Special inducements should be given to natives of the United States who will fit themselves linguistically, in addition to the other qualifications, to enter the service. From top to bottom, it should be placed upon a scientific basis, entirely outside the control of politics.

The voluntary, unsought, and unsolicited emigration to the United States has been the means of building up an intellectual, energetic, and prosperous community. Our country has received, not the high born, but the strong and always the oppressed, whose past history made them all the more appreciate their condition here.

The children of the colonial period were pushed upwards in the social scale by the immigrants, who in turn push each other upward as they come in.

It is not true that the native of four or five decades ago stepped from one occupation to the other. The upward movement was gradual, and the promotion was rather that of generations than individuals.

Science and invention are working together to abolish occupations at the lower end of the scale and creating new ones at the top. The laborer of Europe has his place in the economy of our age. His whole drift is upward, in spite of all the counteracting influences to the contrary.

Since 1850 the immigrants have always been found on the side of law, public decency, and public morals, as instanced in the response to the call for troops in the Civil War, the agitations for change in money standards, etc. Ever since 1870 those states having the preponderance of aliens could be relied upon to vote on the right side in moral questions in the same proportion in which aliens existed in their community.

In what I have said I have tried to be fair, but I cannot close without saying that our hospitality is abused, and by reason of our defective laws and the general knowledge of the means to evade them in Europe we are receiving an increasing number whose coming will do us no good, but harm.

We have no right to oppose needful measures of legislative relief out of sympathy for the sufferings of the people thus seeking admission to our shores, or out of respect to the traditions which up to now have caused this country to be regarded as an asylum.

There is only one Ellis Island in the world; no other country has its mate, because none offers the inducements to the poor of the world that we do. Let us thank God that this is so and pray that we may be able to keep it so, and that the twentieth century may bring to America the fruition of all its hopes, and the standard of progress and freedom which its history has inspired be the torch that will light the world in the same path.

OUR IMMIGRATION DURING 1904

NO one can read the report for 1904 of the Commissioner General of Immigration, Frank P. Sargent, without being seriously impressed with the laxity of our present immigration laws and the urgent need of more stringent regulation of our immigration. The number of immigrants for 1905 bids fair to reach the one million mark. Only a few less than 10,000 landed at New York in two days in November, the least popular season of the year for newcomers. The following facts are taken from Mr. Sargent's report:

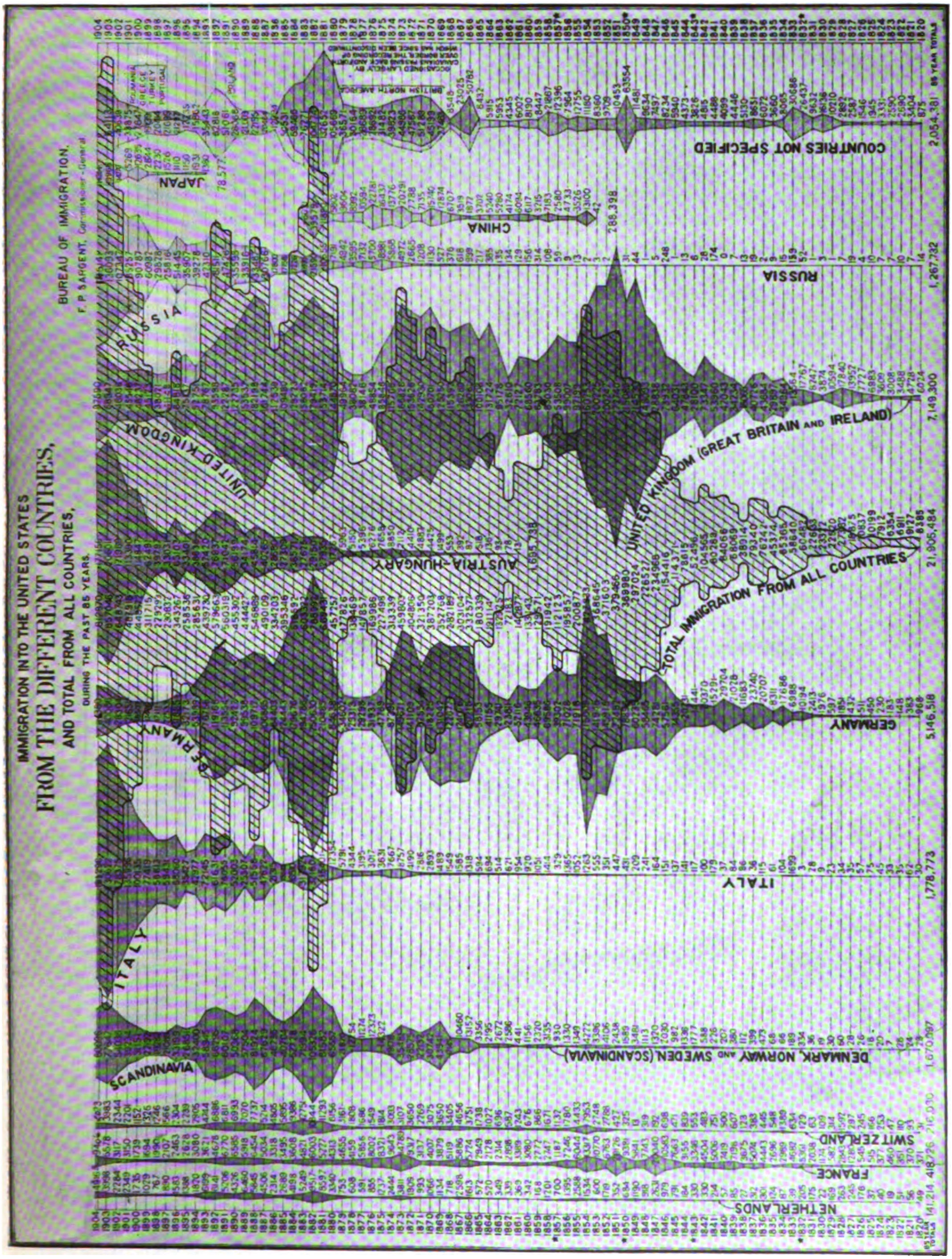
The striking and significant feature of the table of immigrants for 1904 is that the chief diminution is shown in the arrivals from Austria-Hungary, amounting to 28,855, and from Italy, to 37,326, these two countries aggregating 66,181, or twenty-odd thousand more than the total net decrease for the fiscal year 1904. The countries of northern and western Europe, with one notable exception, show increases, Great Britain's increase being 18,643. The one exception to the foregoing statement is shown by the decrease of 18,265 in the arrivals from Sweden.

The only other figures in this table to which attention need be directed are those showing an increase of nearly 100 per cent in the arrivals from China, and a decrease of 5,704 in those from Japan, the latter easily traceable to the pending war in the East.

Of the 812,870 aliens arriving in 1904, 549,100 were males and 263,770 were females—an increase in the females as compared with last year of 19,870 and a decrease in males of 64,046. As respects age, 109,150 were under 14 years, 657,155 were between 14 and 45, and 46,565 were 45 or over; 3,953 could read but not write, 168,903 could neither read nor write, and, it is presumed, the remainder, 640,014, could both read and write. It also appears that 103,750 of these aliens had already been to this country, and that 95,575 brought with them $50 or more each, while 501,530 brought each less than $50. The total amount of money shown to officers by these 812,870 aliens was $20,894,383, or $4,776,870 more than was brought by the 857,046 arrivals of the last year. This fact, taken in connection with the circumstances already referred to as to countries from which the increases of the year under consideration came, furnishes assurance of a marked improvement in the character and thrift of the more recent immigration. The 28,451 English immigrants brought with them in the fiscal year 1903 $1,405,365; this year the 41,479 of the same race brought $2,736,182; the 35,366 Irish last year had $796,082, while the 37,076 Irish this year showed $1,092,781; 71,782 German immigrants last year had $2,480,634, this year 74,790 possessed in hand $3,622,675.

Comparative Statement Showing the Number of Aliens Arrived in the United States, by Countries, during the Fiscal Years ended June 30, 1903 and 1904, respectively, Showing Increase and Decrease for Each Country.

Country.	1903.	1904.	Increase.	Decrease.
Austria-Hungary	206,011	177,156	....	28,855
Belgium	3,450	3,976	526	....
Denmark	7,158	8,525	1,367	....
France, including Corsica	5,578	9,406	3,828	....
German Empire	40,086	46,380	6,294	....
Greece	14,090	11,343	....	2,747
Italy, including Sicily and Sardinia	230,622	193,296	....	37,326
Netherlands	3,998	4,916	918	....
Norway	24,461	23,808	....	653
Portugal, including Cape Verde and Azore Islands	9,317	6,715	....	2,602
Roumania	9,310	7,087	....	2,223
Russian Empire and Finland	136,093	145,141	9,048	....
Servia, Bulgaria, and Montenegro	1,761	1,325	....	436
Spain, including Canary and Balearic Islands	2,080	3,996	1,916	....
Sweden	46,028	27,763	....	18,265
Switzerland	3,983	5,023	1,040	....
Turkey in Europe	1,529	4,344	2,815	....
United Kingdom:				
England	26,219	38,626	12,407	....
Ireland	35,310	36,142	832	....
Scotland	6,143	11,092	4,949	....
Wales	1,275	1,730	455	....
Europe, not specified	5	143	138	....
Total	814,507	767,933	....	46,574
China	2,209	4,309	2,100	....
Japan	19,968	14,264	....	5,704
India	94	261	167	....
Turkey in Asia	7,118	5,235	....	1,883
Other Asia	577	2,117	1,540	....
Total Asia	29,966	26,186	....	3,780
Africa	176	686	510	....
Australia, Tasmania, and New Zealand	1,150	1,461	311	....
Philippine Islands	132	52	....	80
Pacific islands, not specified	67	42	....	25
British North America	1,058	2,837	1,779	....
British Honduras	81	109	28	....
Other Central America	597	605	8	....
Mexico	528	1,009	481	....
South America	589	1,667	1,078	....
West Indies	8,170	10,193	2,023	....
All other countries	25	90	65	....
Total	857,046	812,870	....	44,176
Aliens in transit	64,269	27,844	....	36,425
Total alien passengers	921,315	840,714	....	80,601



The striped area shows the total immigration. From F. P. Sargent, Commissioner General of Immigration

OUR GOVERNMENT SHOULD ASSIST THE IMMIGRANTS TO DISTRIBUTE THROUGHOUT THE COUNTRY

"The failure of the government to provide for the distribution of aliens through the United States, and the exertions of foreign countries combine, says Mr Sargent, to maintain alien colonies in this country. Such colonies are open to objection not merely on political grounds, but for social and sanitary reasons in a far greater degree. It cannot, in justice to the interests of our country and to the preservation of its institutions, be too urgently or too frequently repeated that in confining our treatment of the all-important immigration problem to the exclusion of such of certain enumerated classes as we can detect our policy is superficial. The practical and pressing question is, What shall be done with the annual arrivals of aliens, approximating now 1,000,000?" The present immigrants throng to the states which now need them least, to overcrowded cities, and entirely neglect the western states, where there is a scarcity of laborers.

FOREIGN COLONIES IN THE UNITED STATES

All the political and social, and occasionally religious, resources of some countries are being directed to one end, to maintain colonies of their own people in this country, instructing them through various channels to maintain their allegiance to the country of their birth, to transmit their earnings here to the fatherland for the purchase of ultimate homes there, and to avoid all intercourse with the people of this country that would tend to the permanent adoption of American ideals. Thus emigration from certain foreign countries has become, in a much larger sense than the public imagines, a revenue resource to those countries, of immediate benefit to them to the extent of the aggregate remittances, of prospective benefit to them because it insures the return of the emigrant with his accumulated savings.

ABILITY TO READ AND WRITE

An examination of the ability of the immigrants to read and write shows surprising extremes, of which the following are specially noteworthy:

Only 3 per cent of 10,077 Finns from Russia were illiterate;

4 per cent of 40,526 Germans from the German Empire;

4 per cent of 22,507 Germans from Austria-Hungary;

1 per cent of 36,486 English;

1 per cent of 11,226 Scotch;

3 per cent of 36,747 Irish, and

1 per cent of 59,878 Scandinavians.

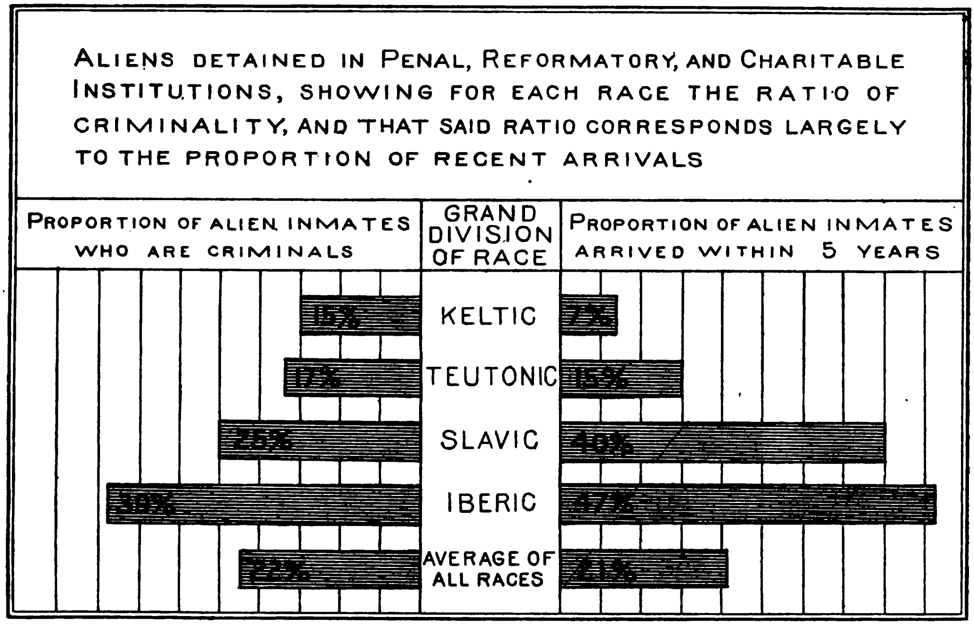
On the other hand, as large a proportion as 36 per cent of 32,577 Poles from Russia could not read or write, and the same illiteracy is true for the Poles from Germany and Austria-Hungary; 23 per cent of 77,544 Hebrews from Russia could not read or write and 20,211 Hebrews from Austria-Hungary showed the same degree of illiteracy.

The percentage of illiteracy among the north Italians is only 13, yet it is as high as 48 among the south Italians. We are receiving nearly six times as many south Italians as we are north Italians, and yet the latter are far more desirable immigrants than the former.

AMBITIONS OF CERTAIN IMMIGRANTS

One member of a large family from eastern Europe, composed of a father, mother, and six children all under ten years of age, with hardly any money, and bound for the tenement district of New York city, was recently asked at Ellis Island how he intended to provide a competent subsistence for his family if allowed to land. He answered: "What do I care for a big house if I can get one room to sleep in. That is all we want; that is the way we did in Russia."

This particular family was excluded.



ALIENS DETAINED IN PENAL, REFORMATORY, AND CHARITABLE INSTITUTIONS, SHOWING FOR EACH RACE THE RATIO OF CRIMINALITY, AND THAT SAID RATIO CORRESPONDS LARGELY TO THE PROPORTION OF RECENT ARRIVALS

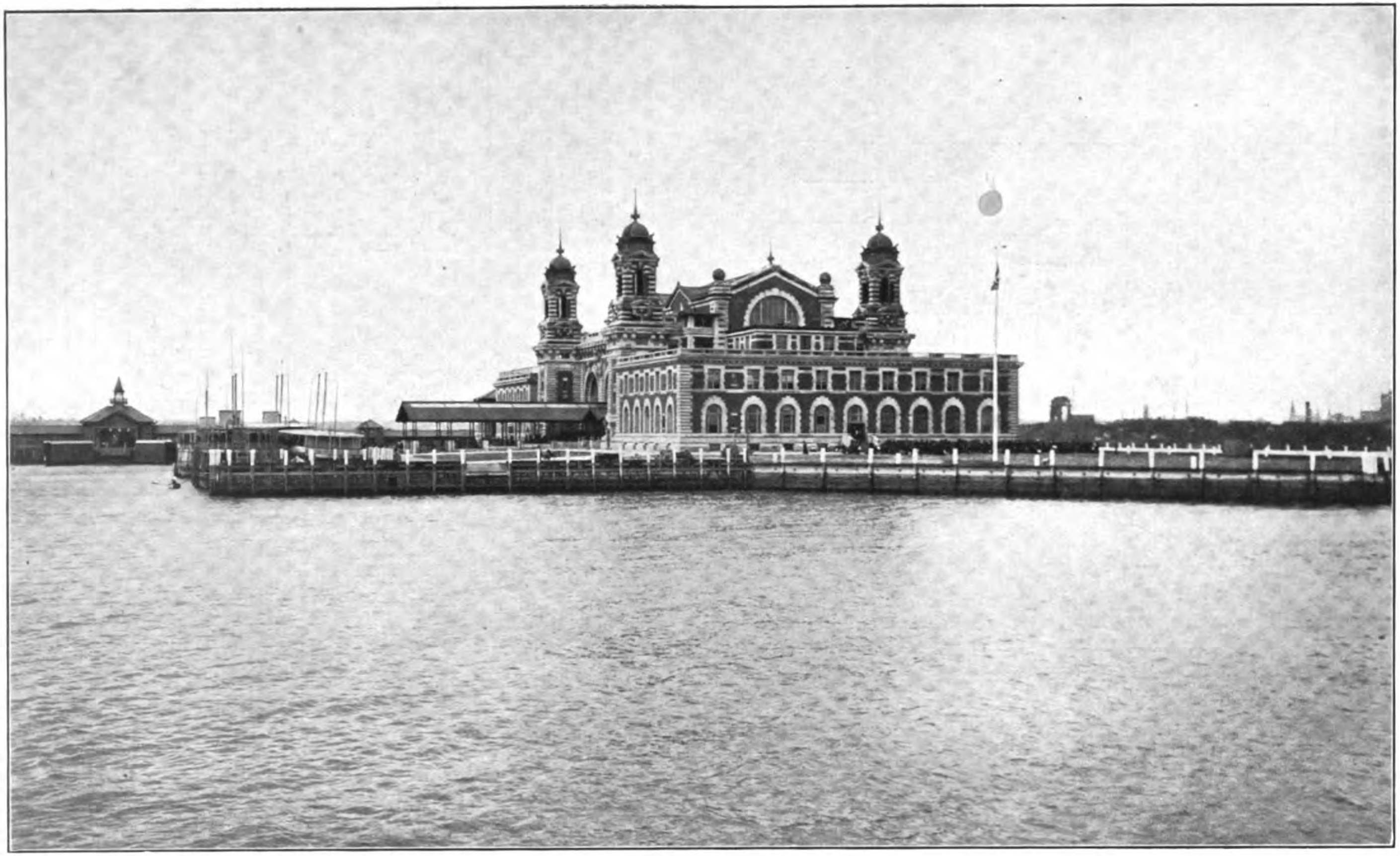
From F. P. Sargent, Commissioner General of Immigration

This chart shows the ratio of criminality of the four principal grand divisions, viz.: Keltic, Teutonic, Slavic, and Iberic. The Iberic division leads in criminality, with Slavic second, Teutonic third, and Keltic fourth. The Iberic ratio of 39 per cent is thought not to show the true condition, as it was found impracticable in the compilation of these figures to exclude the Italian (north) who belong with the Keltic grand division from the Italian (south) who belong with the Iberic grand division. In this connection it is pointed out that there were 809 aliens confined in the institutions of the United States proper for murder, 253 of whom were Italians; there were 373 confined for attempts to kill, 139 of whom were Italians. This is a ratio of one Italian to two aliens of all other races. From this diagram it will be seen that the racial divisions that have the largest percentages of recent arrivals detained are the ones that have the highest ratio of criminality. (See pages 26 and 27.)

But we are receiving many other families of a similar character bound for the tenement districts of our large cities, and with aspirations as narrow as those above described, whom it is not possible to exclude under existing law, for it does not necessarily follow that they are likely to become public charges from the fact that they will go to an overcrowded tenement district and occupy inadequate quarters.

Of the so-called "Americans" who have obtained their citizenship by rushing to the United States, living here long enough to take out papers, and then hurrying back to their native land, Inspector Marcus Brown gives the following illustration:

"The conditions I found to exist there (Jerusalem) are even worse, if such be possible, than in Syria. In the city of Jerusalem alone I found over 1,000 'American citizens,' the vast majority of whom, being Hebrews, live there ostensibly for religious reasons. A number of them are engaged in some business pursuits. These, however, are in the minority, the prevailing majority living on charity, mostly on the so-called 'chaluka' (the biblical one-tenth), which



From F. P. Sargent, Commissioner General of Immigration

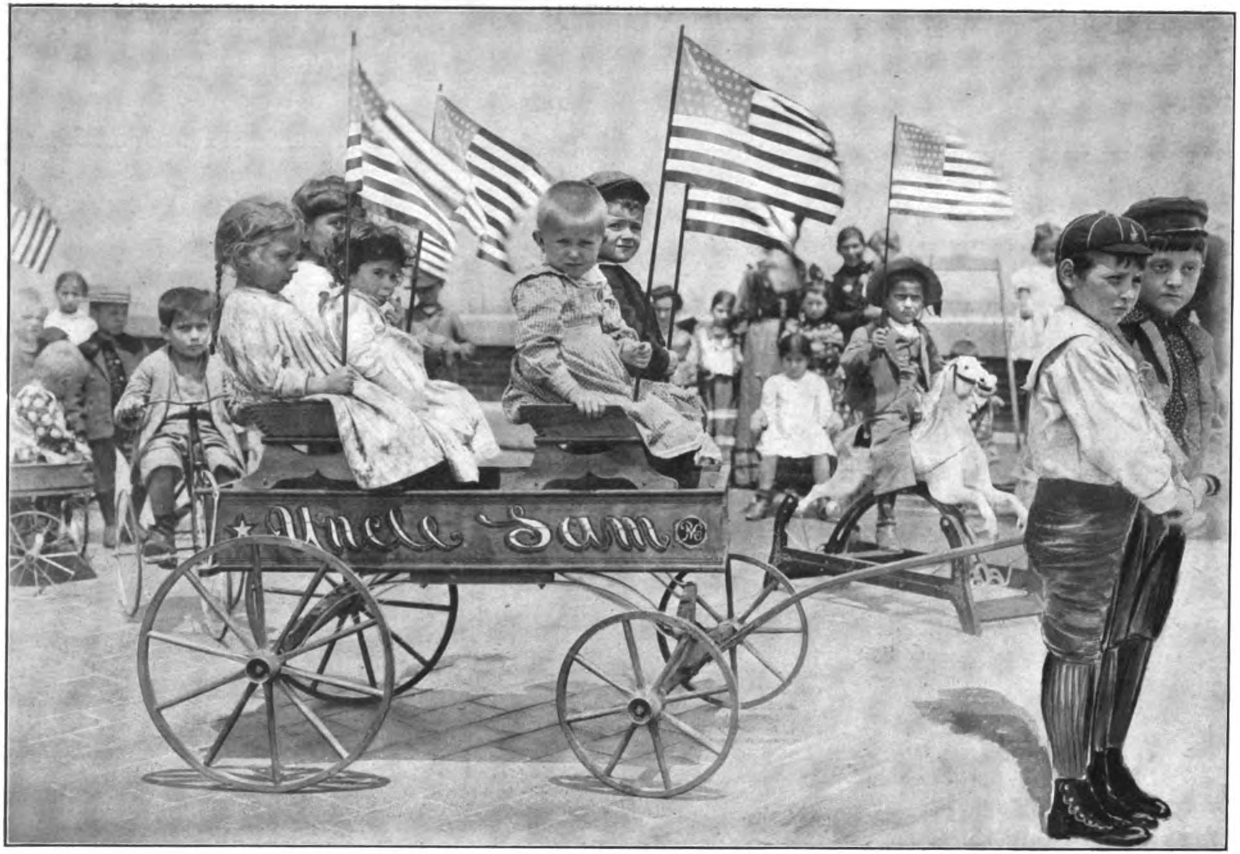
United States Immigration Island, Ellis Island, New York Harbor

About three-fourths of our immigrants land at Ellis Island. During 1904 606,009 landed here, 60,000 at Boston, 56,000 at Baltimore, 19,500 at Philadelphia, and 9,000 at San Francisco.

From F. P. Sargent, Commissioner General of Immigration

United States Immigrant Station, Ellis Island, Looking North Toward New York City, 1904

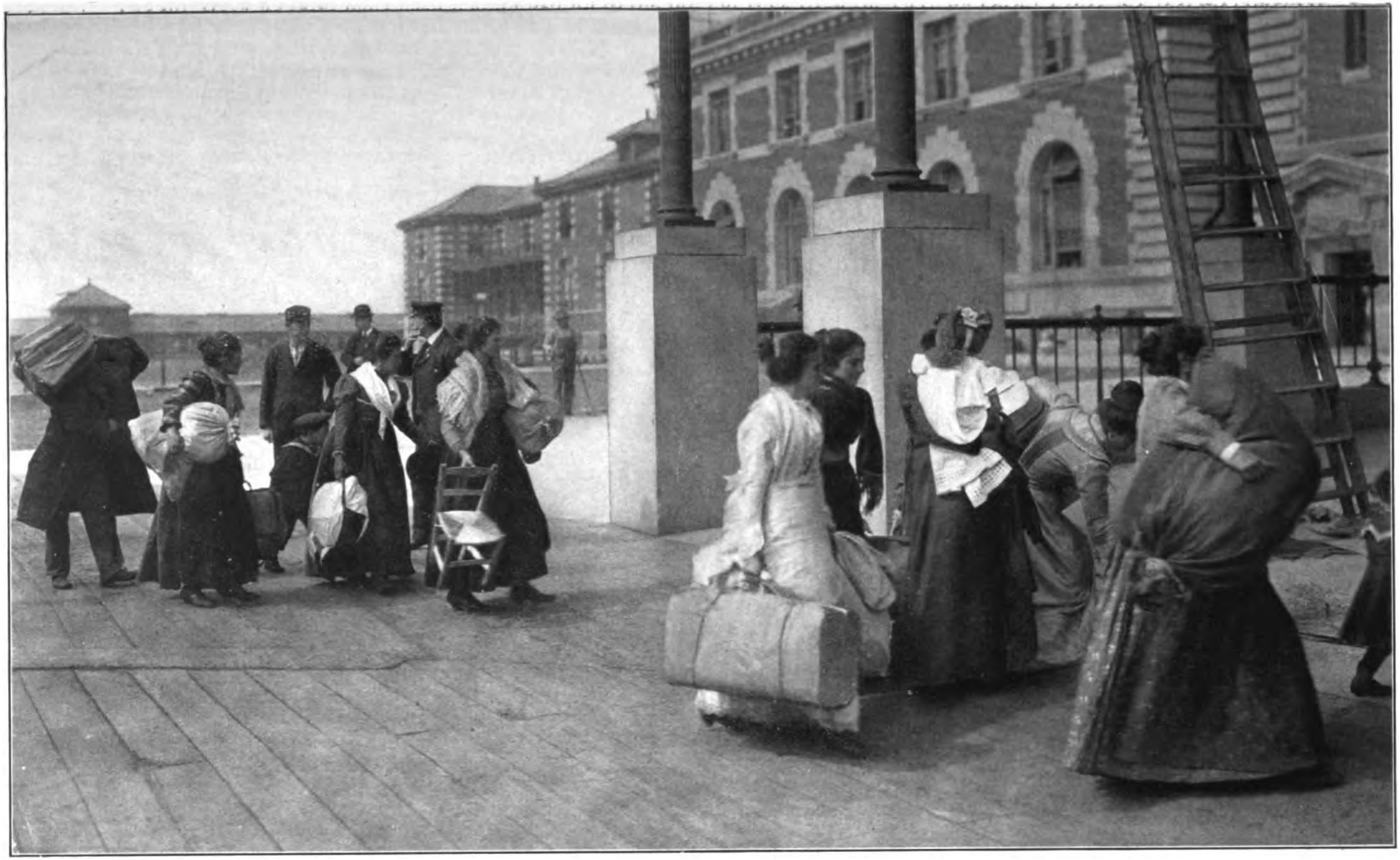
Mr. Sargent has endeavored to make the surroundings of the Ellis Island Station attractive, realizing the importance that the first impressions of the immigrant should be as favorable and inspiring as possible.



From F. P. Sargent, Commissioner General of Immigration

Children's Roof Garden, Ellis Island Station, N. Y.

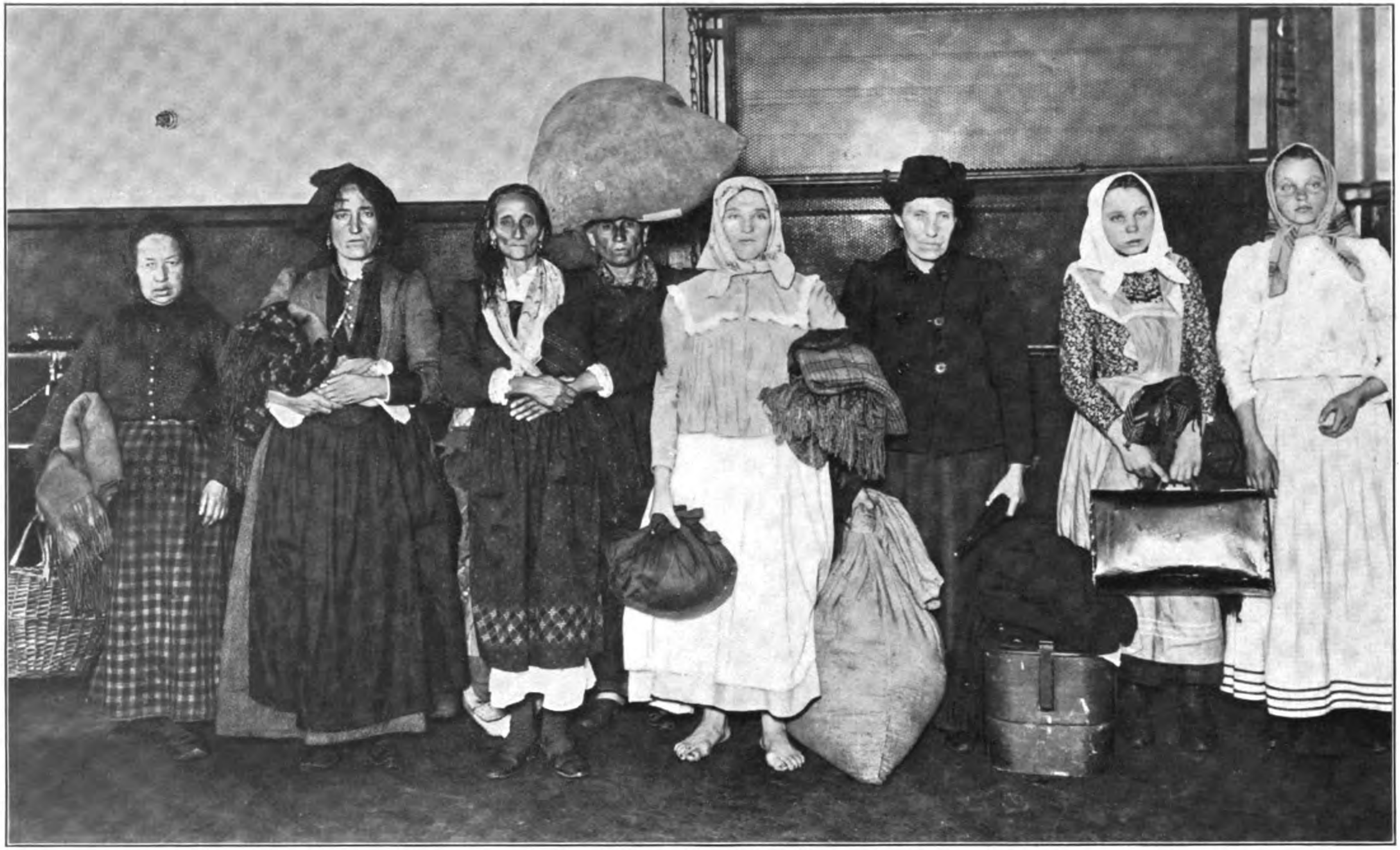
At the suggestion of Mr. Sargent, special provision has been made at Ellis Island for the amusement of detained children by converting a portion of the roof garden into a playground, where they may enjoy fresh air and various kinds of amusements.



From F. P. Sargent, Commissioner General of Immigration

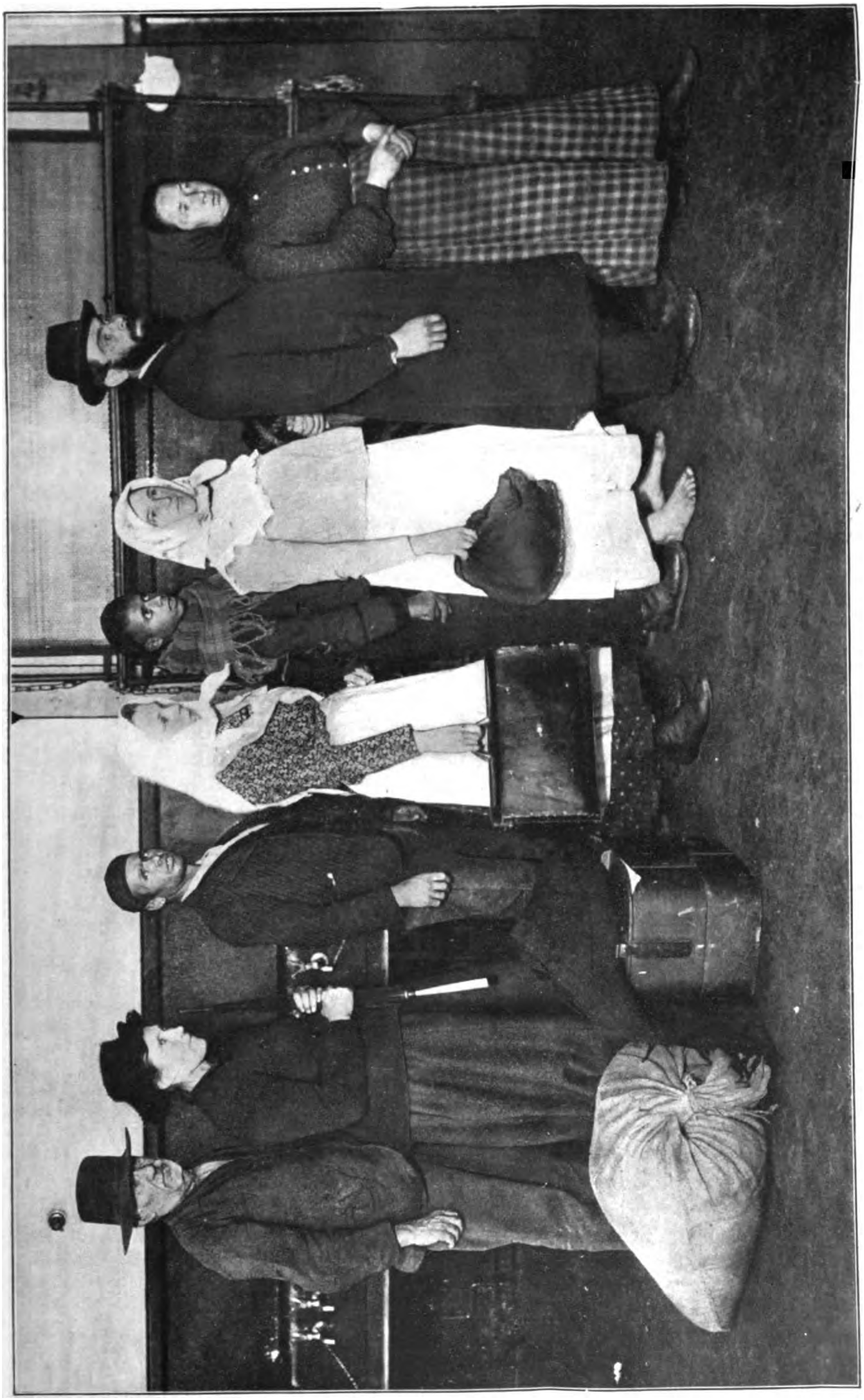
Aliens Entering Ellis Island Station

About 8,000 aliens were refused admission in 1904. Of this number 4,800 were paupers, 1,600 were diseased, and 1,500 contract laborers.



Types of Aliens Awaiting Admission at Ellis Island Station

Mr Sargent discusses at considerable length the rate war between the steamship lines. As the rate war has been confined to English ports, the effect has been most noticeable in that country. Its effect upon the United States, though in the main undesirable, has in some respects been beneficial. It has resulted in an exodus of domestic and agricultural labor from Great Britain, which is viewed with alarm by the people of that country. These classes of emigrants come here with the avowed intention of following their regular occupations, which are certainly not overcrowded in America. The rate war is also responsible, in connection with the war between Russia and Japan, for a marked improvement in the physical appearance of the Russians emigrating to America. Large numbers of young men from Russia, between 18 and 30 years of age, leave the German ports on every vessel departing for the United States. The full steerage rates have been maintained up to the present time from the German ports; hence the vast movement from central and northern Europe which seeks an outlet there has not been given any stimulus by decreased fares; but for the fact that the German emigration laws prohibit indirect emigration, a large number of trans-German passengers would have gone to England to take advantage of the cut rate from English ports. The possible evil effects of cheap rates for emigrant traffic are recognized in the Italian emigration law, which forbids the sale of an emigrant ticket for less than a certain sum.



From F. P. Sargent, Commissioner General of Immigration

Types of Aliens Awaiting Admission to Ellis Island Station

During 1904 we received more Hebrews than of any other race, except Italians. (See page 7.)

they obtain from all over the world, either through organized charitable organizations or from private individuals. These people send out thousands upon thousands of letters annually begging charitable contributions, and they cause Dr Merrill, the United States consul, and his dragoman no end of trouble.

"These alleged 'American citizens,' although they enjoy and avail themselves of the high privilege and protection of American citizenship, are, in truth and in fact, not Americans at all, and quite a number of them have become naturalized by fraud."

PUBLIC CHARGES

Although each year several hundred aliens have been returned to the countries whence they came because they were public charges, and several thousand others were originally refused admission to the United States because likely to become public charges, the recent investigation of the charitable institutions of the country conducted by the Bureau of Immigration actually found about 30,000 alien paupers, including insane, in the public institutions and another 5,000 in the charitable institutions under private control. About 10,000 alien criminals were found in the penal institutions, making altogether a grand total of 45,000, 40,000 of whom are supported exclusively at public expense. In addition thereto, there are probably 65,000 naturalized foreigners in these institutions.

The states in which are located the large cities have the largest proportions of aliens detained in their institutions. For instance, out of 44,985 aliens in all the institutions of the United States, 12,440, or 28 per cent, are in the State of New York; 5,601, or 12½ per cent, in Pennsylvania; 5,490, or 12 per cent, in Massachusetts, and 3,359, or 7½ per cent, in Illinois, making a total of 26,890 in the four states mentioned, which is 60 per cent of the entire number in the United States.

The enormous proportion of aliens taken care of in the insane and charitable institutions of the United States is shown by the fact that the proportion of alien population to citizens in the whole United States is 1 to 75, while within the insane and charitable institutions the proportion is 1 alien to 6 United States citizens. The proportion in penal institutions has not yet been determined, but is undoubtedly even greater than 1 to 6.

RACIAL DISTRIBUTION

Increasing proportions of immigrants are going to Pennsylvania, Ohio, and West Virginia, while the percentage for the neighboring State of New York has gradually decreased from 42 per cent in 1892 to 32 per cent in 1904. The far Western States are attracting increasing proportions and the Middle West and South decreasing percentages year by year.

It is of interest to note in this connection the uniformity of the fluctuation of immigration to the New England States, each of them having attracted increasing proportions from 1892 to 1895 or 1896, with decreased percentages since (leaving out of consideration the increase for Vermont during the past three or four years).

Iberic and Slavic divisions:* About 70 per cent of the immigration going to the seven states, New York, Pennsylvania, New Jersey, Ohio, Delaware, Maryland, and West Virginia, which group receives 60 per cent of the entire immigration to the United States, belong

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* The different races or peoples or, more properly, subdivisions of race coming from Europe have been grouped by Mr Sargent into four grand divisions, as follows:

Teutonic division, from northern Europe: German, Scandinavian, English, Dutch, Flemish, and Finnish.

Iberic division, from southern Europe: South Italian, Greek, Portuguese, and Spanish; also Syrian from Turkey in Asia.

Celtic division, from western Europe: Irish, Welsh, Scotch, French, and north Italian.

Slavic division, from eastern Europe: Bohemian, Moravian, Bulgarian, Servian, Monteto the Iberic races of southern Europe (principally south Italian) and Slavic races of eastern Europe, including Magyars from Hungary. Of the great bulk of immigration going to New York 34 per cent is south Italian and 23 per cent Hebrew. Other Eastern and Southern States and Indiana, Illinois, and Missouri get large percentages of immigrants belonging to the Iberic and Slavic divisions. Louisiana is conspicuous because of heavy percentage of south Italians.

Teutonic division: The Northwestern States get heavy percentages of immigrants of Teutonic blood from northern Europe, the States of Michigan, Minnesota, North and South Dakota, Iowa, Kansas, Nebraska, and Utah each receiving from 65 to 90 per cent of immigrants of this class.

Celtic division: New England and some of the Southern States show moderate proportions of immigrants of the Celtic division. This class of immigrants, however, is most conspicuously represented in the Southwest and Rocky Mountain regions.

Mongolic division: Most of the immigrants of the Mongolic division, principally Japanese, go to Hawaii and the Pacific coast. Of all the immigrants going to Hawaii 82 per cent are Japanese.

OCCUPATIONS

Examination shows that immigration to the mining regions of the Alleghenies, Lake Superior, and Rocky Mountains is composed of comparatively few families and a very large proportion of laborers, while that to the agricultural districts of the Middle West and South is composed of comparatively few laborers and large proportions of families. The latter fact is conspicuously the case with regard to the tier of seven prairie states and territories from North Dakota to Texas, where nearly half the immigration consists of women and children classed under the head "no occupation," with a corresponding decrease in the proportion of laborers. It is notable also that the Teutonic element in the immigration to this tier of states greatly predominates.

VIEWS OF LHASA

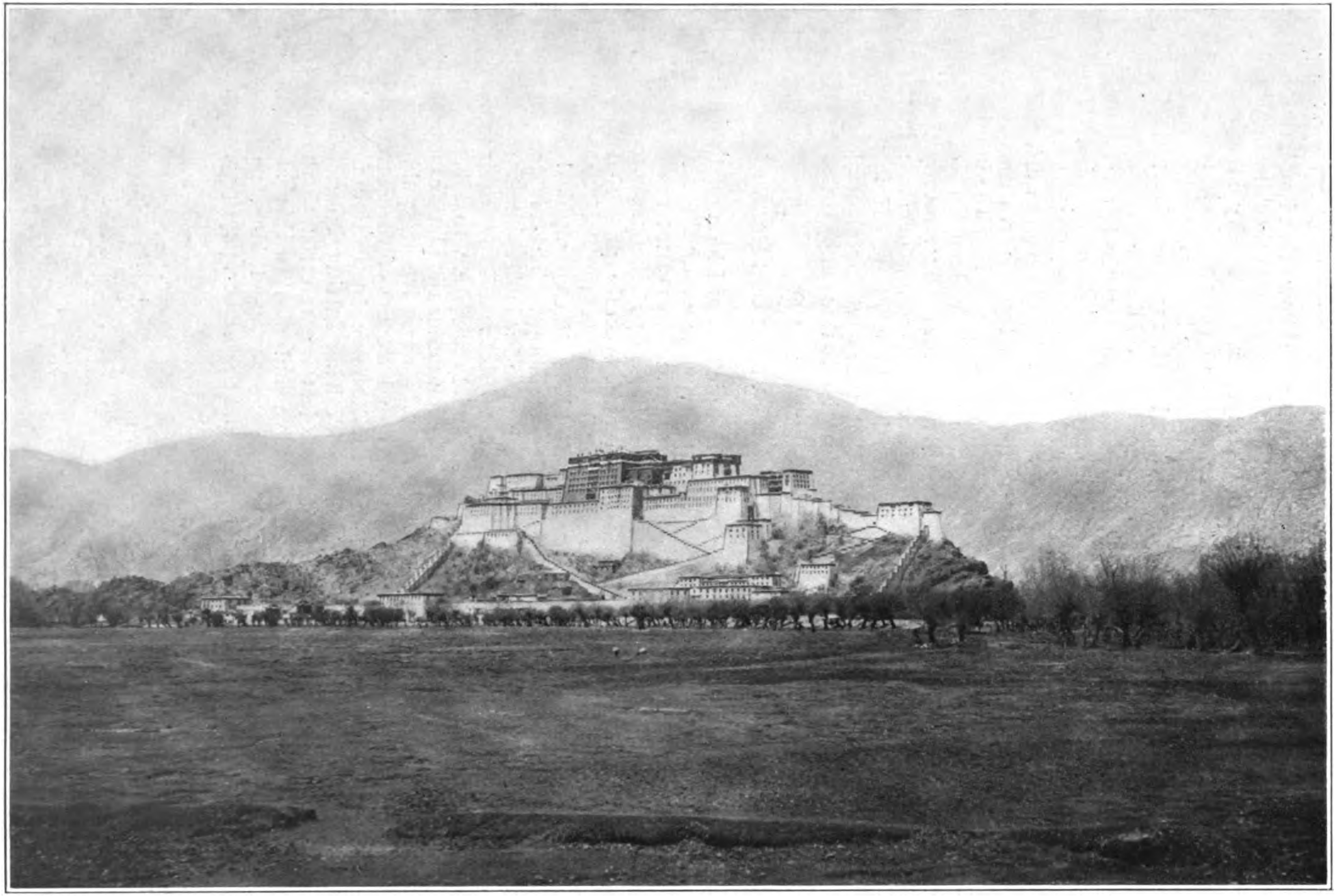
THE pictures of Lhasa published in this number of the NATIONAL GEOGRAPHIC MAGAZINE are selected from a series of 50 Tibetan photographs which were recently presented to the National Geographic Society by the Imperial Russian Geographical Society of St Petersburg. The pictures were taken by the Buriat Tsybikoff and the Kalmuck Norzunoff on their recent semi-official expedition to Tibet. The notes given under the pictures are from Tsybikoff's narrative as published in the Annual Report of the Secretary of the Smithsonian Institution for 1903. Those desiring further information on the subject are referred to the above narrative and also to this Magazine, July, page 292, and May, page 228, 1904, and September, page 353, 1903.

negrin, Croatian, Slovenian, Dalmatian, Bosnian, Herzegovinian, Hebrew, Lithuanian, Polish, Roumanian, Russian, Ruthenian, and Slovak.

The Mongolic division has also been added, to Include Chinese, Japanese, Korean, East Indian, Pacific Islander, and Filipino.

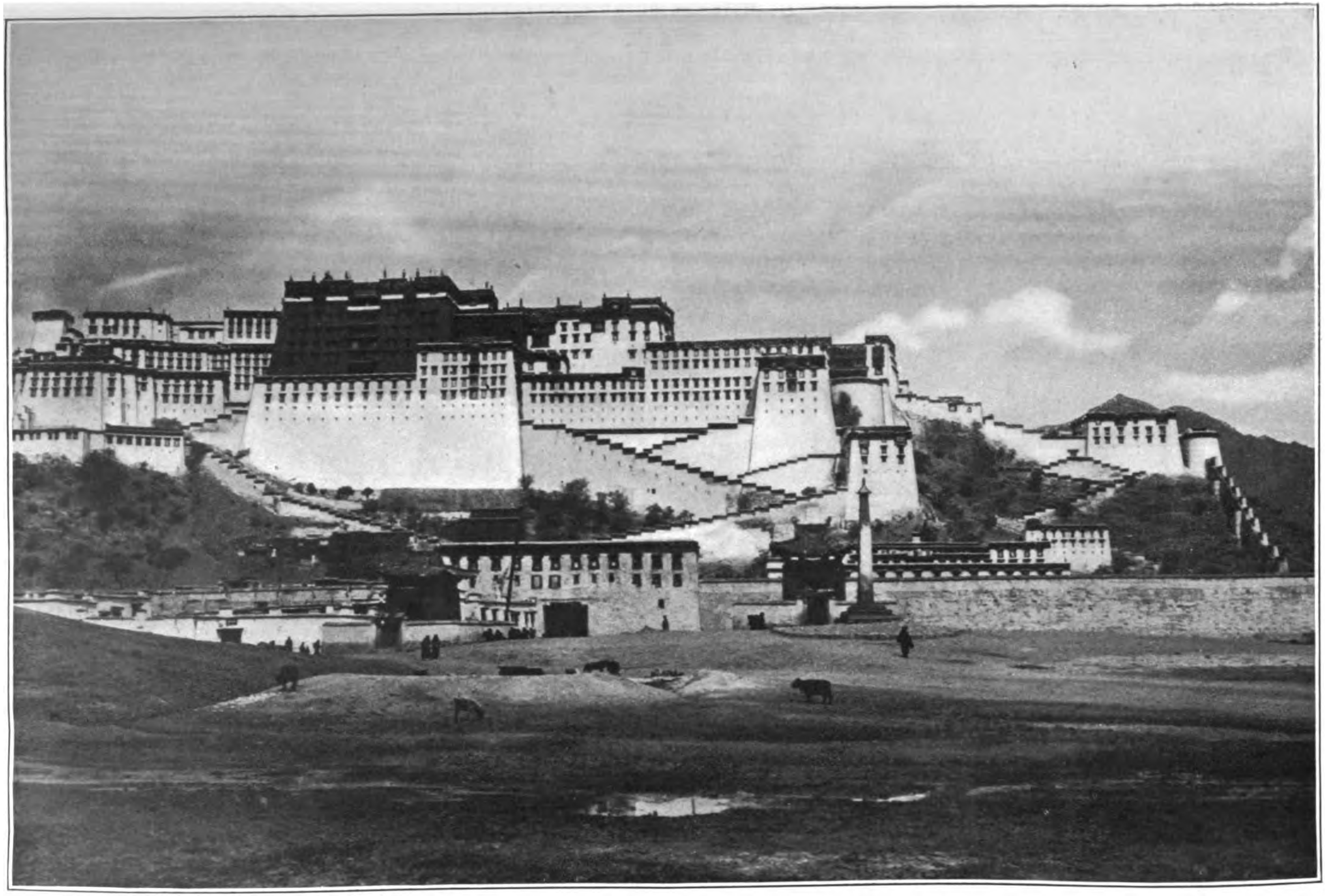
Under "all others" have been included Magyar, Turkish, Armenian, African (black), and subdivisions native to the Western Hemisphere

By reason of blood mixture this classification is somewhat arbitrary, especially with regard to Finnish, Scotch, and southern Germans.



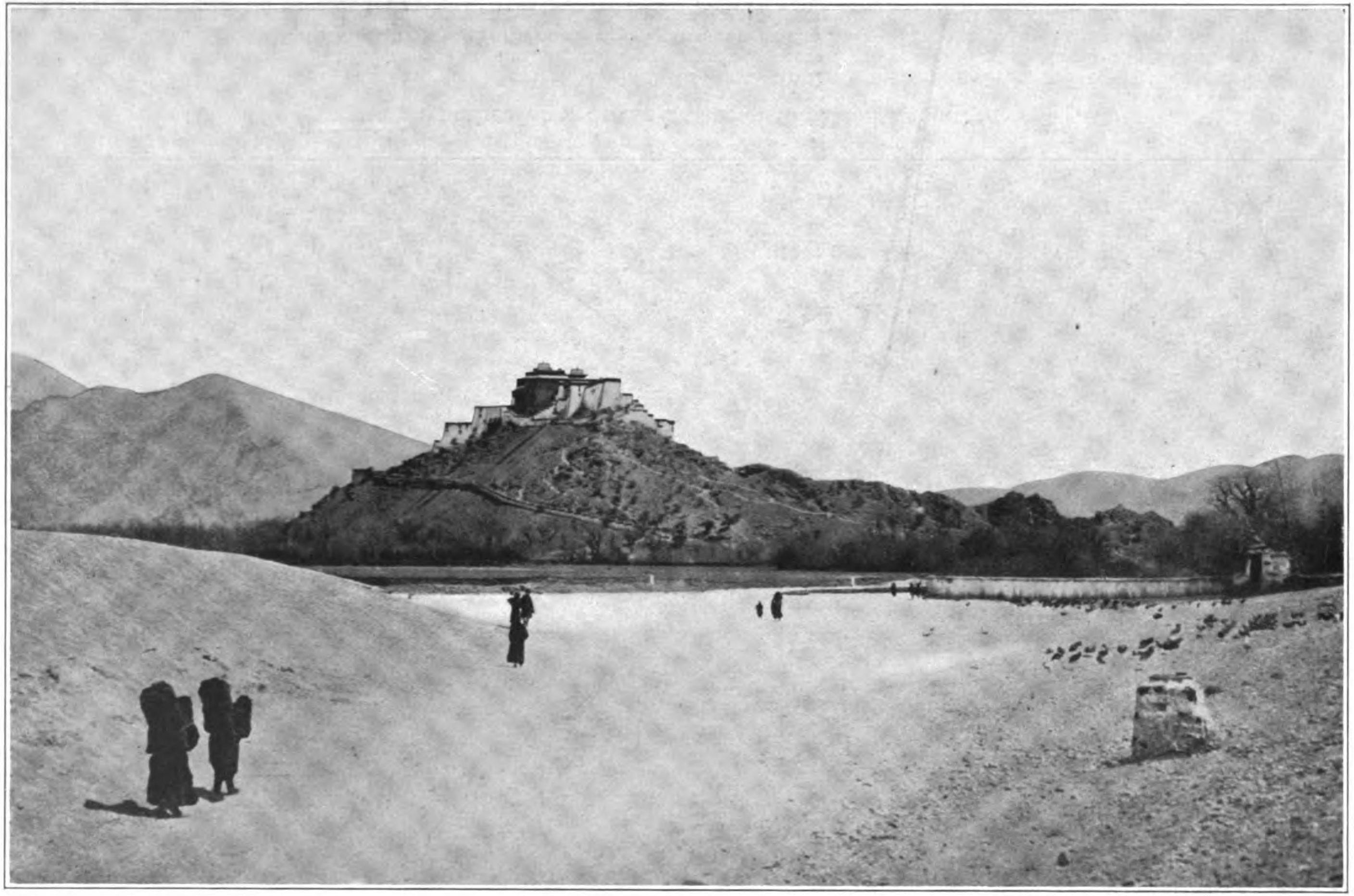
The Palace of the Dalai-Lama at Lhasa

The palace of the Dalai-Lama, Potala, is about two-thirds of a mile west of the city, and built upon a rocky height. The foundation of the palace, tradition says, was laid by Srongzang Khan during the seventh century. The main central portion, called the "red palace," was added some time later. This palace and additions were planned to serve as a means of defense



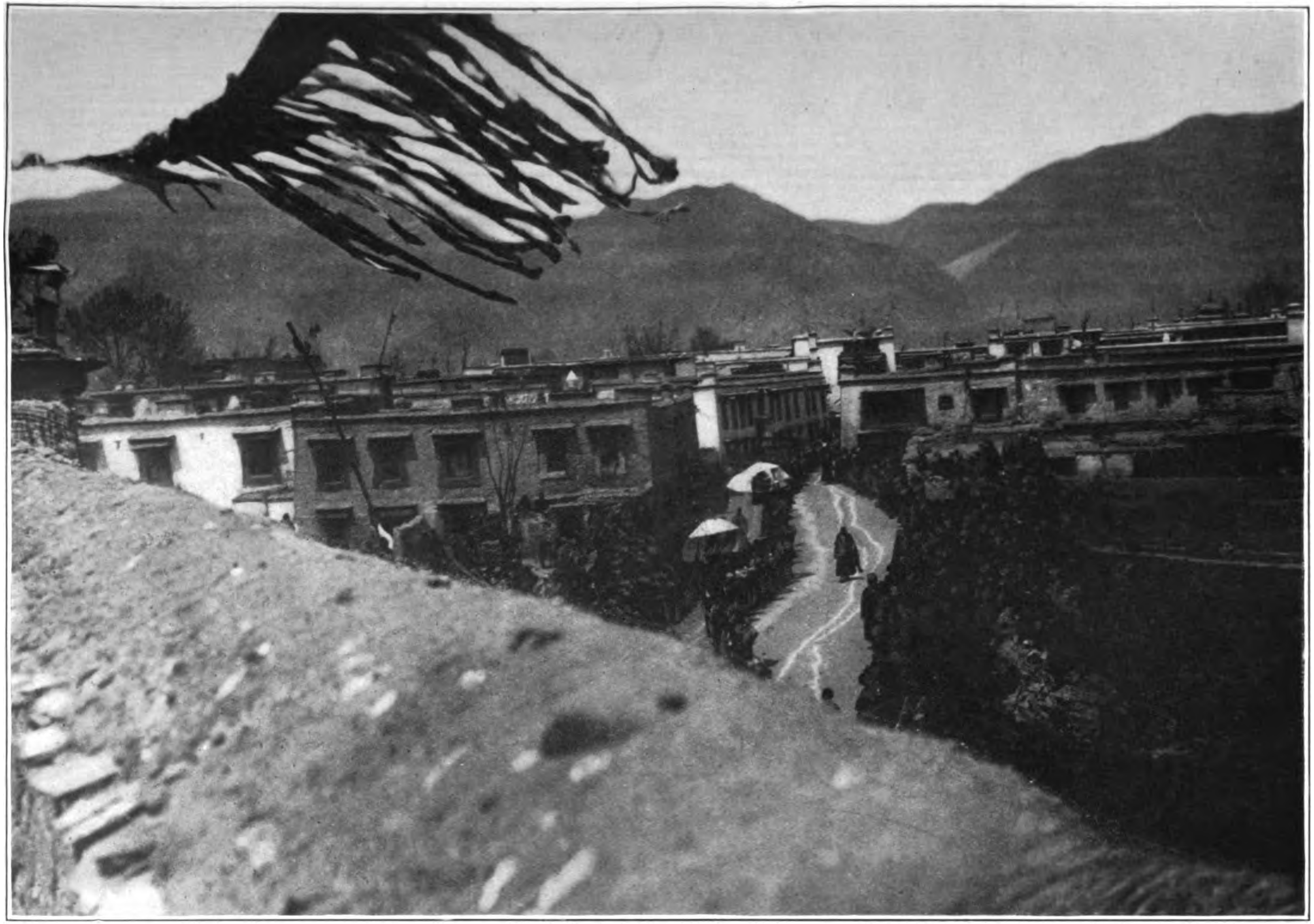
Another View of the Palace of the Dalai Lama

The palace is about 1,400 feet long and about 70 feet high in front. In the construction of this palace the Tibetans displayed their highest architectural skill. Here are found the most precious treasures of Tibet, including the golden sepulchre of the fifth Dalai-Lama, which is about 28 feet high. The treasures and apartments of the Dalai-Lama are in the central portion of the temple palace. The remainder of the building serves as quarters for various attendants or followers of the Dalai-Lama, including a community of 500 monks, whose duty it is to pray for the welfare and long life of the Dalai-Lama



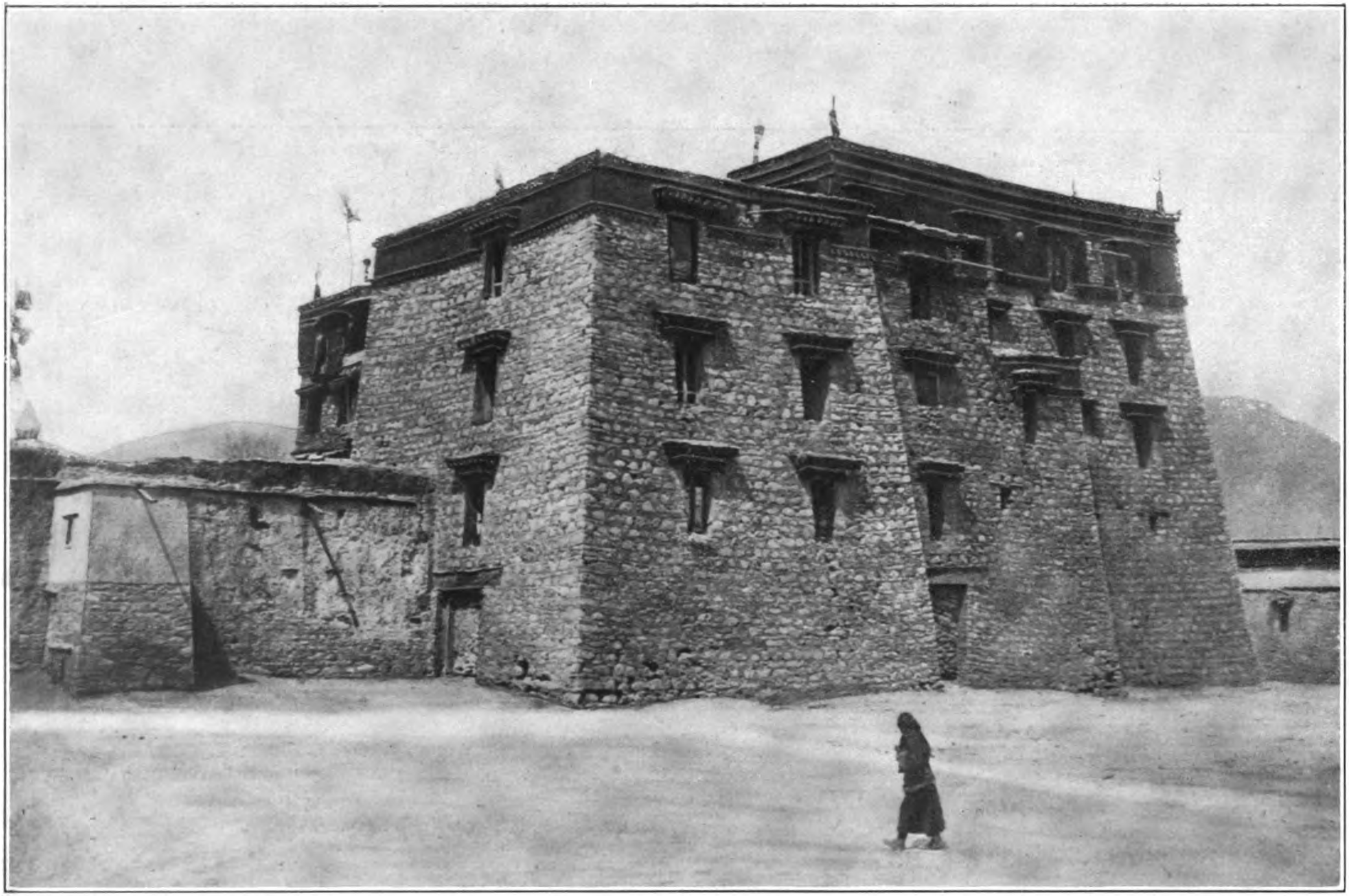
A View of the Palace of the Dalai-Lama from the West

The unequal distribution of wealth and the subservience of poverty to wealth are conspicuous throughout Tibet. There is such little commerce that labor is very cheap, the most expert weaver of native cloth receiving about 8 cents and board per day, while an unskilled woman or man laborer earns only 2 or 3 cents. The highest salary is paid to the Lamas, the prayer readers, who receive 10 cents a day for incessant reading. A house servant almost never receives pay beyond food and meager clothes



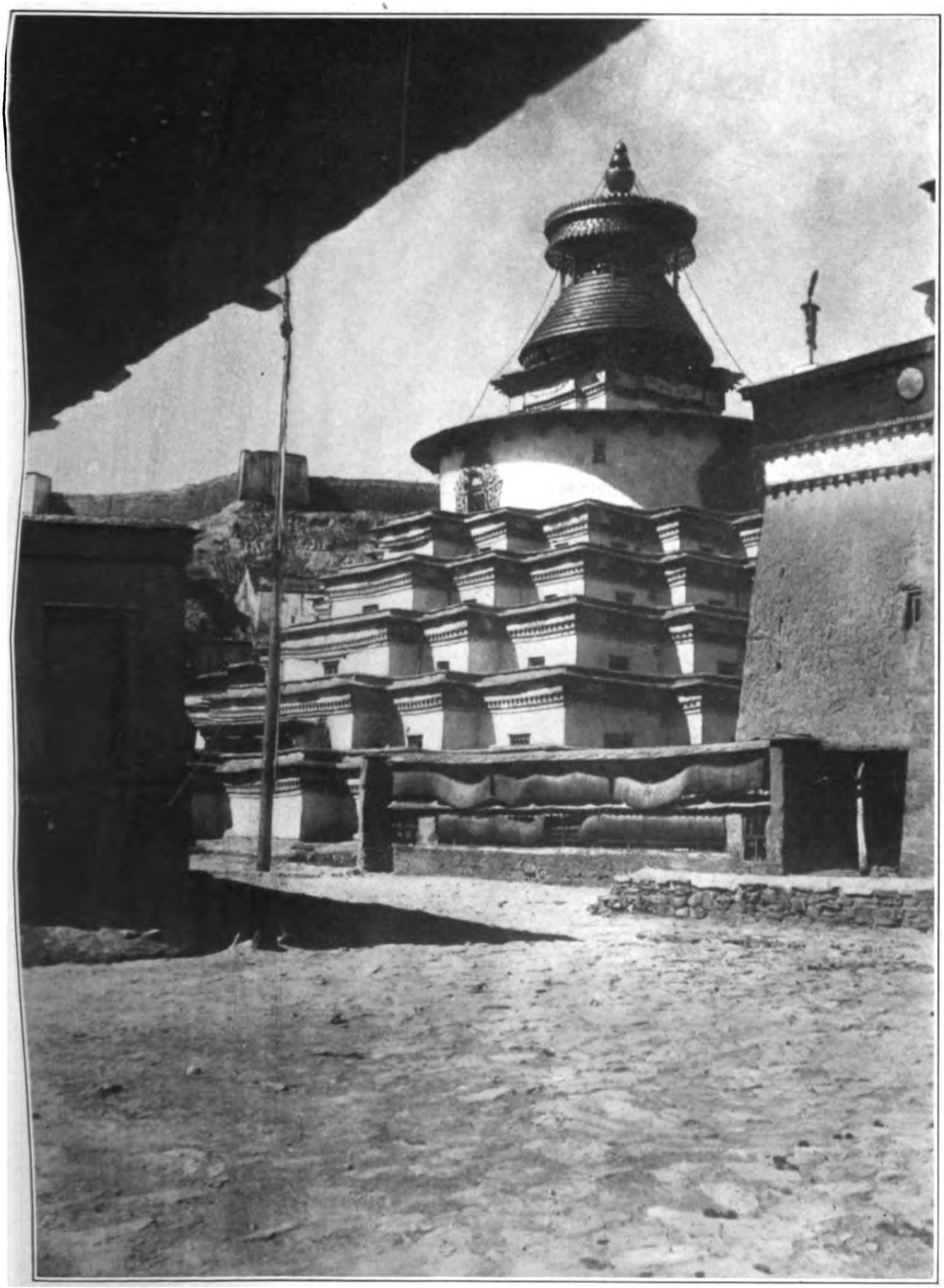
A Street Scene in Lhasa

The houses are of stone or of unburnt brick, cemented with clay. The windows are without panes, or hung with cotton curtains, though in winter oiled native paper serves as protection from the cold. The houses have no chimneys. The principal fuel is dry manure of horned cattle and yaks

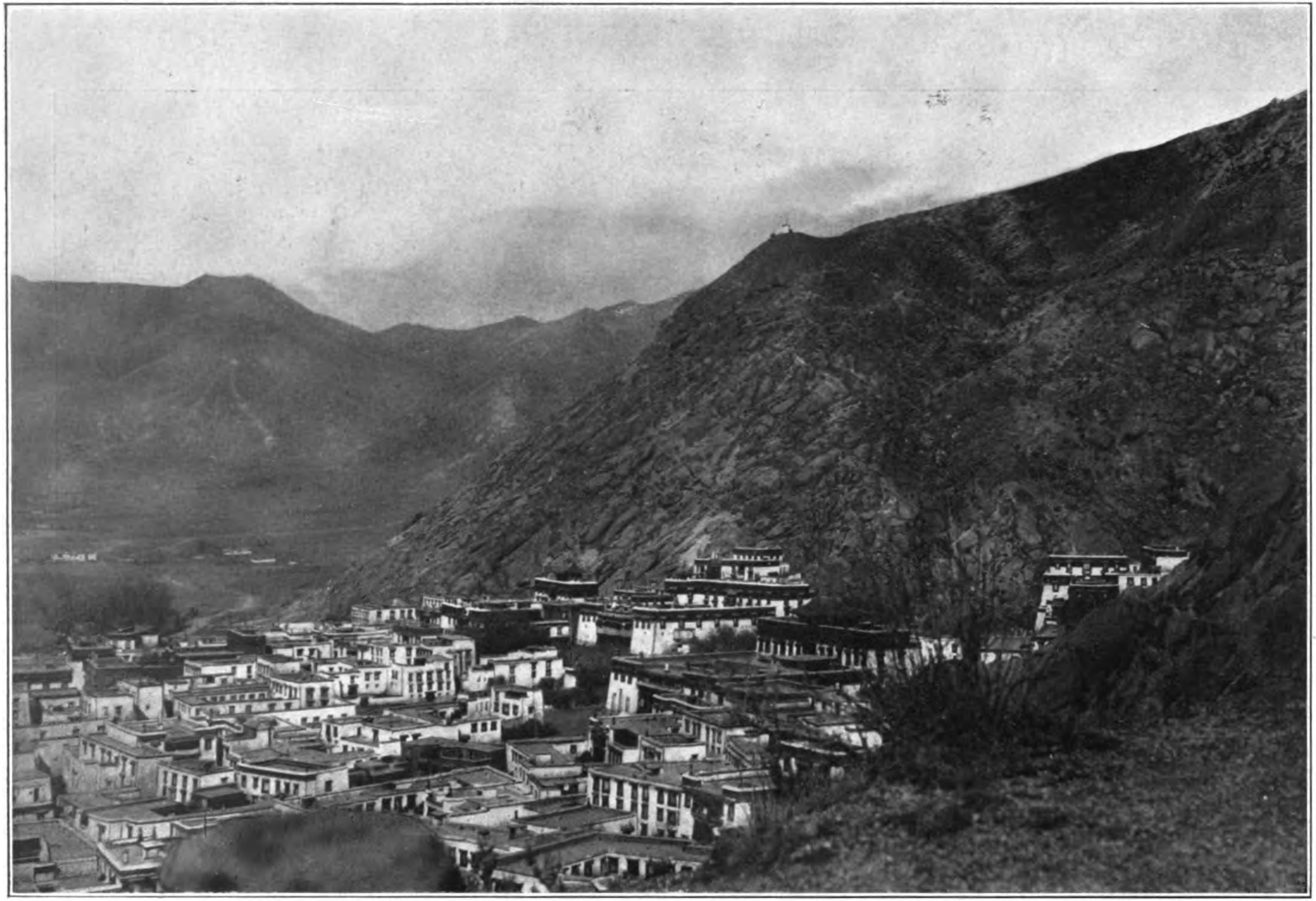


Palace of the Old King of Tibet, at Lhasa

The clothing of a Tibetan is of special design, made from native cloth in various colors. The poor classes wear white, the cheapest color; the richer people red and dark red, the soldiers dark blue, and yellow is used by higher dignitaries and princes. Women prefer the dark red cloth. Of course, other colors are also met with. In proportion to their means, Tibetans dress rather elegantly. Their jewelry is of gold, silver, corals, diamonds, rubies, pearls, turquoise, and other stones.

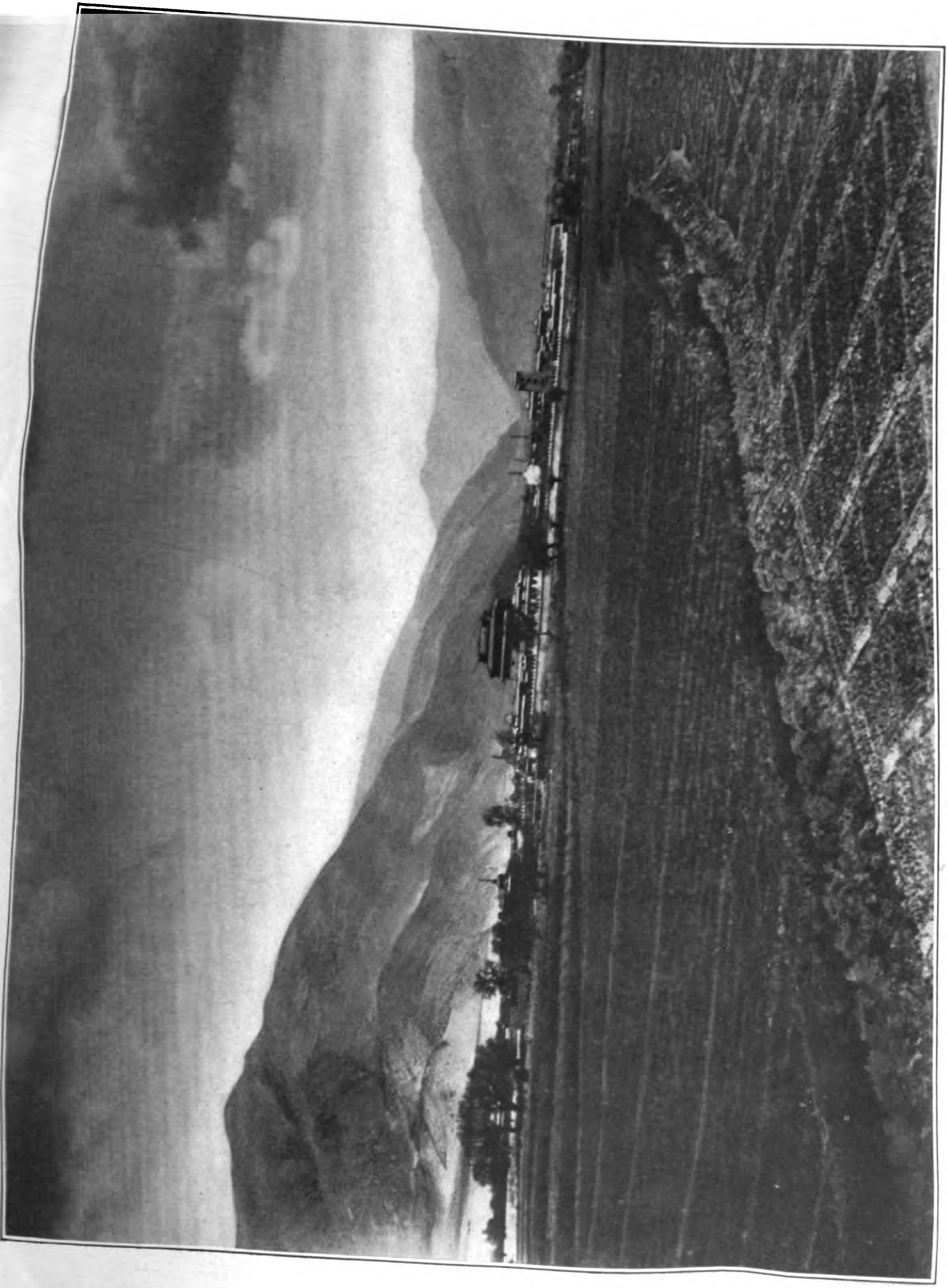


Buddhist Temple in the Center of Lhasa



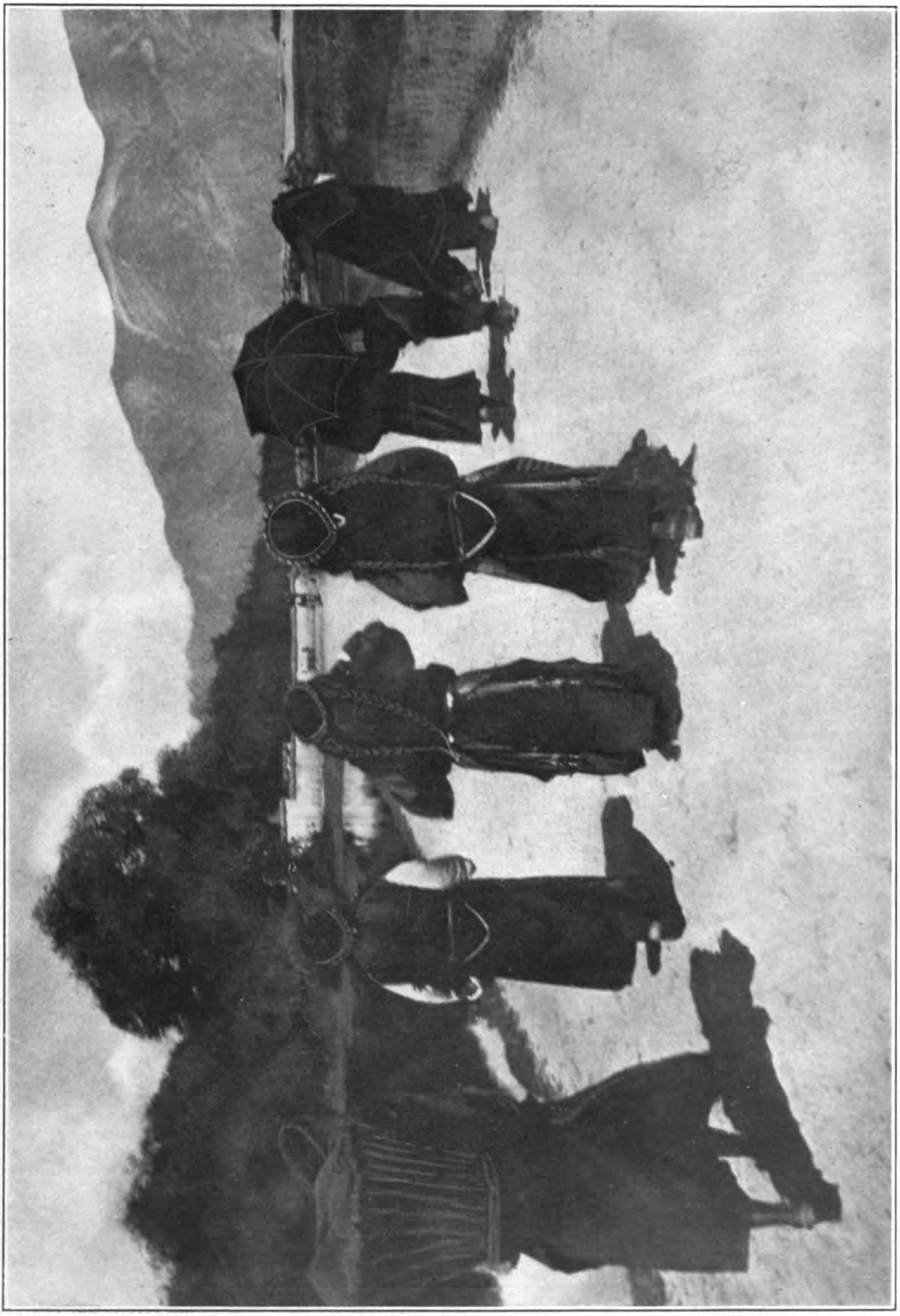
A View of Lhasa from a Neighboring Hill

The building crowning the peak about the center of the picture is the monastery of Sera, which is famous in Tibet for its ascetics. The civilian population of Lhasa scarcely exceeds 10,000 persons, about two-thirds of them women, although the number may seem greater on occount of the proximity of two large monasteries, the many transient visitors, and the gatherings of worshippers from lamaite countries.



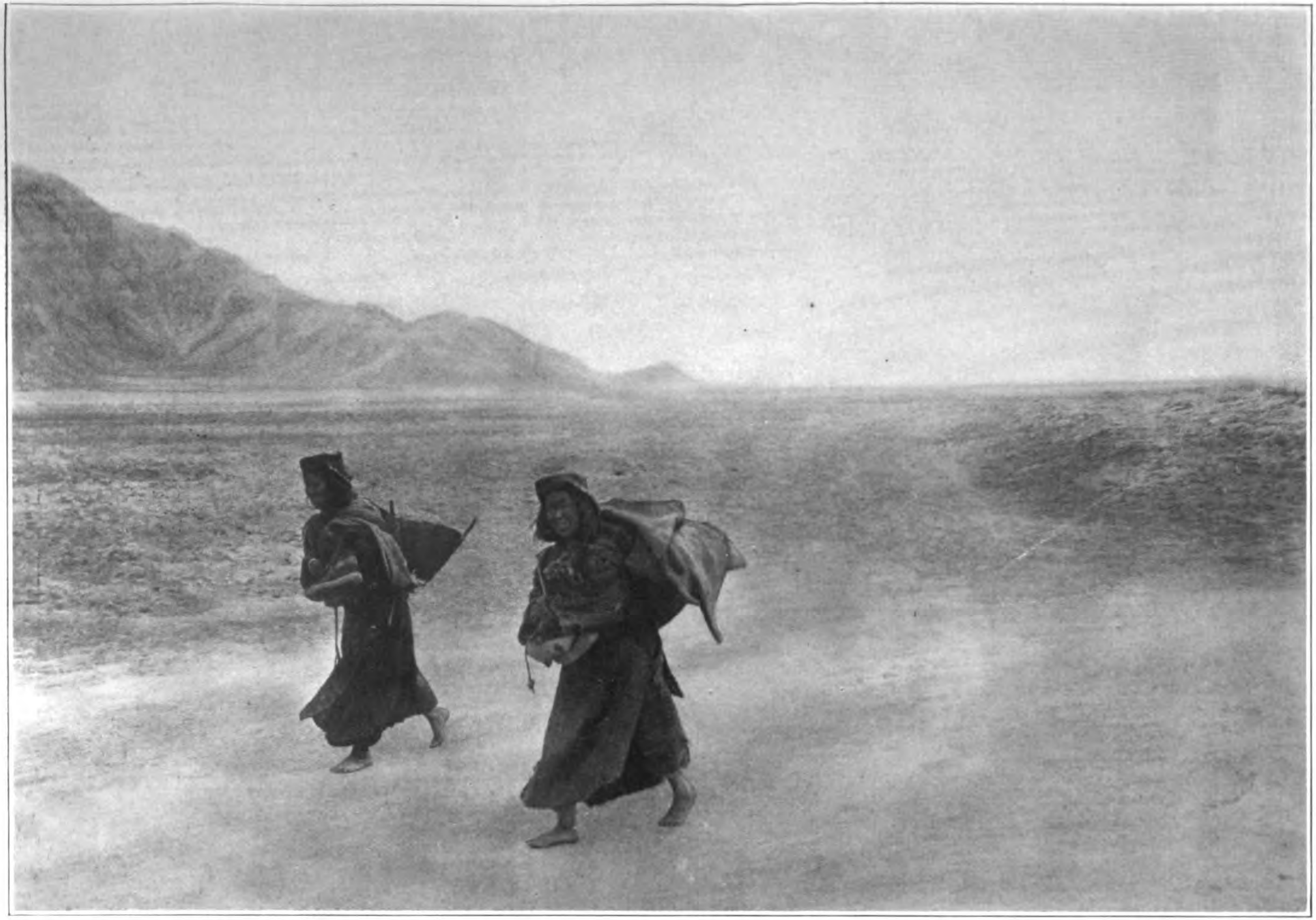
The Outskirts of Lhasa

The orchards and trees in the outskirts of the city give the place a very beautiful appearance, especially in spring and summer, when the gilt roofs of the two principal temples glisten in the sun and the white walls of the many stoned buildings shine among the green tops of the trees; but the delight of the distant view at once vanishes upon entering the city with its crooked and dirty



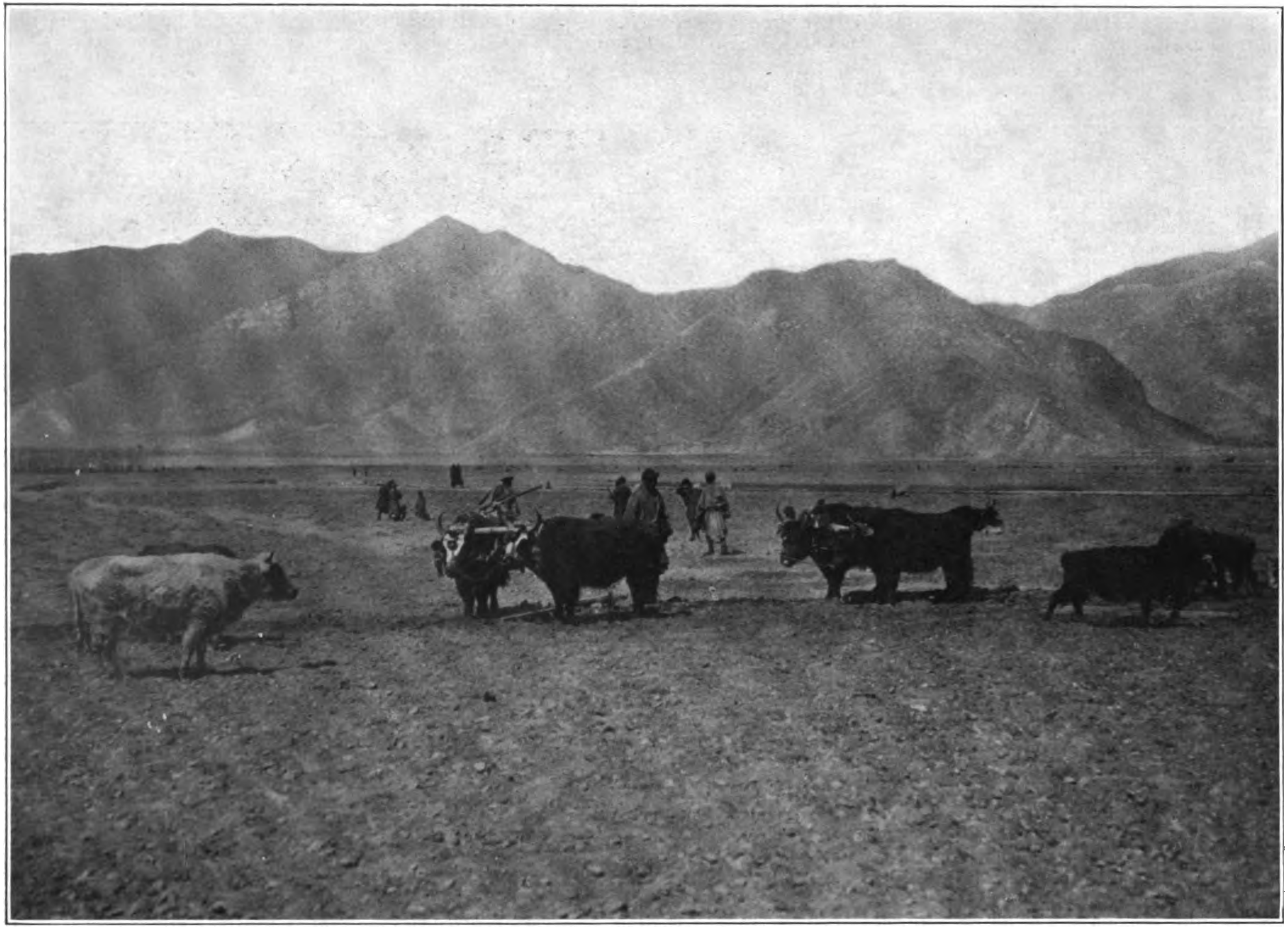
On the Road which Circles Lhasa

The circular road along which the pious make their marches around Lhasa on foot or in prostrate bows is about 8 miles long. When these bows are faithfully performed the circle is completed in two days, making about 3,000 bows a day.



Women from the Country on the Way to Market in Lhasa

The Tibetans seem to be inclined to joviality, which manifests itself in song and dance during their frequent public holidays. Women enjoy perfect freedom and independence and take an active part in business affairs, often managing extensive enterprises unaided.



A Farming Scene in Tibet

Agriculture is the chief occupation of the settled population. Barley is the standard crop, from which the popular and harmless barley-wine is made; then comes wheat, for wheat flour; beans for oil, and peas, used by the poorer class in form of flour, or crushed for horses, mules, and asses. The field work is done principally by "dzo" (a cross breed of yak and ordinary cattle), yaks, and asses.

THE FARMERS OF THE UNITED STATES

"*The activities of our age in lines of research have reached the tillers of the soil and inspired them with ambition to know more of the principles that govern the forces of nature with which they have to deal.*"—President Roosevelt in his message to Congress, December 8, 1904.

The report for 1904 of Hon. James Wilson, Secretary of Agriculture, makes a small volume of 114 pages. It is a story of remarkable development and of wondrous wealth. We recommend it for perusal by every reader of this Magazine. The following is an abstract of the report.

FAVORED with continued prosperity in 1904, the farming element of the people has laid broader, deeper, and more substantial the foundations of a magnificent agriculture. A period of some industrial depression during the last two years has been saved by the farmers from the severer conditions that must otherwise have befallen in consequence of the absorption of a large portion of the readily convertible capital of the non-agricultural classes into great and prevalent speculations.

WEALTH PRODUCED BY FARMERS

As great as the financial successes of agriculture were in 1903, hitherto without equal, those of 1904 advanced somewhat beyond them. While some products have fallen behind in value, others have more than filled the deficit, and the general result is that the farmers have produced in value much more wealth than they ever did before in one year.

One conspicuous item that has contributed to this is the corn crop. *The farmers could from the proceeds of this single crop pay the national debt, the interest thereon for one year, and still have enough left to pay a considerable portion of the government's yearly expenses.* The cotton crop, valued for lint and seed at 600 millions, comes second, while hay and wheat contend for the third place. Combined, these two crops will about equal in value the corn crop. Notwithstanding the wheat crop shows a lower production than any year since 1900, the farm value is the highest since 1881. Potatoes and barley reached their highest production in 1904; save in 1902, the oat crop was never so large by 60 million bushels. The present crop of rice promises a yield of 900 million pounds—300 million more than ever before.

Horses and mules reach the highest point this year, with an aggregate value exceeding 1,354 million dollars. On the other hand, cattle, sheep, and hogs all show a slight decline.

The steady advance in poultry leads to some astonishing figures. *The farmers' hens now produce 1⅔ billions of dozens of eggs, and at the high average price of the year the hens during their busy season lay enough eggs in a single month to pay the year's interest on the national debt.**

After a careful estimate of the value of the products of the farm during 1904, made within the census scope, it is safe to place the amount at 4,900 million dollars after excluding the value of farm crops fed to live stock in order to avoid duplication of values. This is 9.65 per cent above the product of 1903 and 31.28 per cent above that of the census year 1899.

Some comparisons are necessary to the realization of such an unthinkable value, aggregating nearly five billions of dollars. *The farmers of this country have in two years produced wealth exceeding the output of all the gold mines of the entire*

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* Every American is thus eating about 245 eggs a year.

world since Columbus discovered America. This year's product is over six times the amount of the capital stock of all national banks; it lacks but three-fourths of a billion dollars of the value of the manufactures of 1900, less the cost of materials used; it is three times the gross earnings from the operations of the railways and four times the value of all minerals produced in this country.

The year 1904 keeps well up to the average of exports of farm products during the five years 1899–1903, amounting to over 859 millions, while the average for the five years was nearly 865 millions. During the last 15 years the balance of trade in favor of this country, all articles considered, exceeded 4,384 million dollars, but taking farm products alone, these showed a balance in our favor of more than 5,300 millions.

The increase in farm capital the Secretary estimates conservatively at 2,000 million dollars within four years—this without recognizing the marked increase in the value of land during the past two years. The most startling figures shown as illustrating the farmers' prosperity are those presented by deposits in banks in typical agricultural states. The Secretary selects for this illustration Iowa, Kansas, and Mississippi. Taking all kinds of banks, national, state, private, and savings, the deposits increased from June 30, 1896, to October 31, 1904, in Iowa, 164 per cent, in Kansas 219 per cent, and in Mississippi 301 per cent—in the United States 91 per cent. A similar favorable comparison may be made as to the number of depositors.

GENERAL PROSPERITY OF THE FARMER

The diffusion of well-being among farmers throughout all parts of the country is one of the most conspicuous features of the recent agricultural development. This attracted attention a year ago and is now even more noticeable. The great South is more especially enjoying this growth of well-being, owing to the enhanced value of the cotton crop in addition to the general progress in agriculture. The Eastern farmer, who was long on the verge of bankruptcy in competition with the virgin soil and rapid expansion of the northern half of the Mississippi River Valley, has survived that competition and now enjoys more normal conditions, owing to the creation and maintenance of many large near-by markets by many varied industries. The Pacific coast has long been prosperous, with its world-famous specialties; the mountain states are glad with the fruits and promises of irrigation; in the older prairie states the farmer has seen his land go from $1.25 an acre, or from a homestead gift, to $100 and $150, and the "Great American Desert," as it was called when it was nothing but a buffalo range, is now peopled by a progressive race of farmers, whose banks are filled to overflowing with the proceeds of their products.

EDUCATIONAL WORK

The elements of agricultural science are gradually finding their place in the primary and secondary schools through the instruction of teachers.

We buy over $200,000,000 worth of products from tropical countries that cannot be grown in continental United States. Through scientists sent from the United States to the several island groups the department is instructing the people of our island possessions to grow these things, such as coffee, rubber, fibers, drug plants, nuts, fruits, spices, and the like.

Our farmers buy $100,000,000 worth of machinery every year. A better knowledge of its use and care is necessary. Several agricultural colleges are taking up this inquiry and giving instruction in regard to machinery and farm buildings.

WEATHER BUREAU FORECASTS

The regular forecasts of the Weather Bureau for 36 and 48 hours in advance have been made daily throughout the year, besides special warnings of gales, cold waves, frosts, heavy snows, floods, etc., which have been issued for the benefit of commercial and agricultural interests. Forecasts are issued, moreover, for the first three days out of steamers bound for European ports. The river and flood service had several opportunities to demonstrate its usefulness and growing efficiency, and owing to the advices and warnings of the Bureau the dangers of the great ice gorges in the Susquehanna, Allegheny, and Ohio rivers were much minimized.

The national weather and crop bulletins were issued from 143 section centers. Besides the extensive distribution of the forecast cards, over 5,000 railroad stations have been supplied with bulletins, and the Bureau has availed itself extensively of the rural free delivery and the rural telephone system, so that forecasts are quickly disseminated throughout a large territory at a minimum of expense.

MOUNT WEATHER OBSERVATORY

The main building of the Weather Bureau Observatory at Mount Weather, Va., has been completed, and the physical laboratory to be erected in another year is being planned. When the equipment is ready apparatus will be utilized to explore the atmosphere to altitudes of from 3 to 10 miles.

During the year arrangements were perfected for a generous increase in the number of daily telegraphic weather reports, and the Secretary reports several submarine cables laid. The Weather Bureau has now 158 stations completely equipped, while 130 steel towers with improved equipment for displaying storm warnings are now installed along the shores of the Great Lakes and the Atlantic and Pacific seacoasts.

INSPECTION OF ANIMALS AND MEAT

Besides safeguarding the live-stock industry at home, the department is fostering the foreign trade. The total export of animal products in the past fiscal year exceeded $223,000,000. The total inspections for export were—for cattle, 790,496; for sheep, 534,850; and for horses, 3,293. There was a great increase in the number of cattle and sheep exported, but a considerable reduction in the number of horses. The loss on cattle in transit to British ports was but 0.17 per cent, and on sheep 0.94 per cent. Clearances of vessels carrying live stock numbered 774.

The inspection of import animals calls for the utmost vigilance in order to prevent the introduction of animal diseases. Importations of pure-bred animals were light, but a very large number were imported from Mexico for breeding purposes.

Inspection of animals and their products was maintained at 51 establishments in cities. Of ante-mortem inspections about 65,000,000 were made and of post-mortem 40,000,000, an increase in both cases over the previous year. The microscopic inspection of pork is restricted to that destined for countries requiring it, and the number of carcasses inspected in 1904 was 313,445, of which 2,643 were found to be trichinous.

PRODUCING NEW BREEDS OF ANIMALS

Preliminary steps have been taken to conduct feeding and breeding experiments in several states looking to the development of breeds of animals suitable to our conditions of climate and soils and capable of meeting the demands of commerce at home and abroad.

The spread over several of the mountain states of a cattle mange required vigorous intervention by the department. It was necessary to detail a large force of experts to supervise the dipping of the herds in order to eradicate the parasite. Coöperation with most of the states has been arranged, and the rest promise to secure state legislation to compel all flock and herd masters to clean their stock.

STUDY OF PLANTS IN PUBLIC SCHOOLS

Special efforts have been made to encourage the study of plants in the public schools. The Secretary argues that our system of elementary education leaves no impression on the child's mind of the importance, value, and usefulness of farm life, while in many ways he is brought early into contact with facts pointing to the value of commercial life. He calls attention to the rapid advances made in agriculture along all lines, and notes the need for bright young men in this field, which he believes offers opportunities as great as in any other. The distribution of seed is being handled in such a way that encouragement of plant growing will be a feature of it in connection with public school work.

NEW PLANT INDUSTRIES

Under the head of new industries developed the Secretary enumerates, first, rice, of which, under the encouragement of the department, there has been enormously increased production in Louisiana and Texas. Preliminary estimates give the area devoted to rice in 1904 in these two states at 600,000 acres, and the crop will approximate 650,000,000 pounds. In reference to durum or macaroni wheat the success attending its introduction continues unabated. Probably no less than 14,000,000 bushels of such wheats will be grown this year. The durum wheats are now being handled without difficulty by many millers. These wheats have been found valuable for bread and can be grown successfully where many other crops fail. Efforts are also being made to introduce the raw material for the manufacture of fine mattings.

IMPROVEMENT IN SUGAR-BEET SEED

In regard to the sugar beet the chief effort of the department has been to effect improvement in the seed and to study the diseases with a view to the discovery of remedies. Strains of pedigreed seed are being established in New York, Michigan, Utah, and Washington, having already assumed commercial importance in the last two states. It seems to be a question of but a few years when the entire 5,000,000 pounds used in the United States will be produced at home. American-grown seed has produced beets testing as high as 24 per cent, and the average in all beets tested from American-grown seed in 1903 was 15.8. The average percentage in all beets grown in the United States is but a little over 11 per cent. During the season of 1904, 14,000 pounds of American-grown seed were distributed by the department for testing in comparison with imported seed. The factories also bought 34,500 pounds of American-grown seed. Interesting experiments in fertilizing were conducted, one in particular showing the difference of over twenty dollars per acre as the result of fertilizing with nitrate of soda.

In the matter of developing sugar-beet seeds with single germs, which would greatly diminish the labor of thinning, the Bureau work has been very satisfactory.

NEW CITROUS FRUITS

Early oranges secured as a result of crossing the sweet orange with the hardy Japanese orange are now ready to distribute, and this work will be inaugurated the coming winter. The oranges are valuable for marmelades and may be grown in nearly all the Southern States. Other citrous fruit developed from the investigations of the Bureau of Plant Industry, such as the tangelo, a cross between the tangerine and the pomelo, promise to be exceedingly valuable.

AMERICAN TEA AND AFRICAN DATES

As heretofore, investigation in American tea production has been continued in coöperation with Dr C. L. Shepard, whose gardens now yield from eight to ten thousand pounds of tea annually. The work of establishing a plantation in Texas has also been continued. Encouraging results have also been secured in the establishment of the African date in Arizona and California.

POPPY ALKALOIDS

In Vermont previous success in growing opium poppies has been repeated with even better results. The attempt to cultivate this plant has been made with a view to supplying our demand for poppy alkaloids for medicinal uses. As the result of the repeated experiments, success has at last attended the effort to obtain morphine directly from the juices of the plant. If this can be done commercially, the plants produced in American fields will replace oriental opium as a crude source for morphine.

CULTURAL WORK ON COTTON

Special work has been done on cotton with a view to bringing home to farmers of Texas and Louisiana, especially in the boll-weevil districts, the advantages of better methods of cultivation and the value of early maturing seed.

The Bureau of Plant Industry has had the advantage of closest coöperation with the Texas Agricultural College, and also with the Louisiana authorities. As a feature of the work in the South, diversification farms were established at various places with a view to showing the value and importance of diversified agriculture. The business interests in the respective communities gladly coöperate in this matter with the Bureau, so that they involve but a trifling expense to the government. Thirty-two of these farms have been or are about to be established. Extensive work has been inaugurated in Texas with a view to breeding new types of cotton better adapted to meet the conditions brought about by the invasion of the cotton boll weevil. Reference is made to the discovery of the Guatemalan ant by an officer of the Bureau, and to the transfer of the study and distribution of this ant to the Bureau of Entomology. Mention is also made of an effort to combat the boll weevil by producing a variety of cotton not subject to injury by this pest.

The Secretary believes it to be within the range of possibility that resistant varieties of cotton may be found in tropical America or developed by selection. As a feature of the work in Texas, a special effort has been made to obtain information as to the best methods of combating the cotton root rot, a disease which has been very serious the past season.

FORAGE CROP INVESTIGATIONS

More attention has been given to alfalfa in the eastern half of the United States in the past two years than to any other crop. The department has demonstrated that this valuable crop can be grown in almost every state in the Union. A large amount of information has been gathered the past year as to the carrying capacity of the ranges in various parts of the West. Intelligent management will bring the ranges back to their primitivs state of productiveness, but there is no chance of improving range conditions except where stockmen are able to control the ranges upon which their stock feed. It has also been demonstrated that many new plants may be introduced upon the range successfully. Plants that may be grown upon alkali lands have been studied.

INVESTIGATIONS OF STANDARD GRASSES

Investigations of standard grasses have been carried on, and it is hoped that within a few years it will be possible to offer farmers small quantities of seed of improved forms of all the standard grasses. A considerable number of native American grasses have shown themselves adapted to the regions where at present hay grasses are wanting. It is believed that hay grasses can be found on the Western plains where the average annual rainfall does not exceed 15 inches. It has been found that a number of plants can be made to furnish satisfactory pasture throughout the winter months in the South, and coöperation is planned with Southern experiment stations and farmers to test a number of such plants for winter-pasture purposes.

NEW FORAGE CROPS FOR THE GULF REGION AND THE PACIFIC COAST

The agrostologists are studying the forage value of the velvet bean, beggar weed, Mexican clover, and cassava for for the region adjacent to the Gulf of Mexico. The Bureau of Plant Industry is seeking to provide suitable forage crops for southern Florida, and it is also searching for forage crops to grow alternately with wheat in the great wheat regions on the Pacific coast, so that the farmers may secure more than one crop every other year,

MARKETING OF FRUITS

Much attention has been given to the development of the trans-Atlantic export trade. Large and profitable shipments of Bartlett pears were made from eastern orchards to British markets. It is known that more than 75,000 packages of this variety were exported, while the total shipments of eastern-grown summer and fall pears amounted to at least 165 carloads.

An encouraging beginning has been effected in commercial shipments of American apples to French markets. The most important experimental export work has been done upon winter apples. The proportion exported has risen from less than 1 per cent of the estimated total in 1899–1900 to nearly 4¾ per cent in 1903–1904, a total of over 2,000,000 barrels, valued at nearly $5,500,000.

COLD STORAGE OF FRUIT

The cold storage of fruit has grown to large proportions, nearly 3,000,000 barrels having been cold-stored in the United States during the last winter as a result of investigations during the past year. It is found that the condition in which the fruit is grown and the manner of handling it determine to a large extent its keeping quality and ultimate value. Fruit intended for storage must be handled with the utmost care in picking, packing, and shipping, and stored quickly after picking, in well-ventilated rooms with a temperature from 31° F. to 32° F.

PLANT-BREEDING WORK

Much important work has been done in plant breeding. Great advances have been made in securing new and desirable long-staple cottons. Important results have been obtained in the breeding and improvement of corn and of oats and potatoes. Some of the most important investigations in breeding and selection have been inaugurated in connection with the growing of tobacco. Extensive work has been carried on in Connecticut, and the work has shown unquestionably that the desirable characteristics in the leaf can be fixed in the first year's selection.

CROPS REQUIRING LITTLE WATER

It is believed that a profitable system of agriculture can be developed for the semi-arid area of the United States by securing crops which will grow with a very small amount of water. Considerable progress has been made in this direction.

MEANS OF DESTROYING ALGÆ IN WATER SUPPLIES

The Secretary calls attention to the investigations carried on by the plant physiologist with a view to finding methods of destroying noxious algæ in water supplies, the method consisting in using extremely dilute solutions of copper sulphate. Numerous tests have been made in coöperation with boards of health and water engineers, and the method has been proved remarkably efficient. The fact that one part of copper sulphate to 100,000 parts of water will at ordinary temperature completely destroy the bacteria causing typhoid fever and Asiatic cholera suggests the great usefulness of copper in fighting these and other diseases.

PRESENT FORESTRY SITUATION

The present situation as regards forestry in the United States the Secretary regards as exceedingly hopeful. The lumber industry seems to be awakening to the fact that lumbering with reference to future as well as present profits may be good business. The general adoption of forestry as an established policy now depends primarily on business conditions. Extensive investigations of forest conditions are still urgently needed. Studies which individuals cannot undertake, but which must be made if the wealth-producing power of the country as a whole is to be brought to the highest point, need to be prosecuted in the public interest. The furtherance of that part of this department's work which is directed toward informing the small owner how he can to advantage practice forestry on his own account is of the first importance.

IMPORTANCE OF SCIENTIFIC STUDY OF FOREST CONDITIONS

There is now no considerable portion of the United States for which the Bureau of Forestry has not at hand special knowledge bearing directly on questions pertaining to the use of the forests. In the work of building up a sound permanent policy for the forests of the national domain, this department continues to render important service, and it is plain that the ultimate function of the Bureau of Forestry as a part of the government administrative equipment is gradually defining itself. The work to which the bureau must hereafter chiefly devote itself includes scientific study of problems having a practical bearing on forest utilization; coöperation with states seeking advice concerning forest legislation, administration, or the formulation of a state forest policy; and, finally, the discharge of any duties assigned to it by the national government in connection with the administration of public lands. The forester is at present the official adviser in technical matters of those departments having in charge forested lands. The greatest need of the West, says the Secretary, is water, and in many states future settlement and prosperity depend absolutely upon its conservation, and this again largely, in many cases wholly, depends upon the preservation of the forests.

The work of planting on forest reserves has been begun in California, Colorado, and Nebraska.

He expresses gratification at the recognition by Congress of the work of the bureau which has enabled it to increase its force within six years 16-fold, and its expenditures 12-fold. That this liberality is true economy is demonstrated by the fact that *a single discovery now commonly applied to the production of turpentine is effecting a saving annually equal to the total expenditures of the Bureau for six years.*

FOREIGN PLANTS IMPORTED

No less than 1,429 selected kinds of seeds and plants were introduced from foreign countries and established in the United States. These included 350 date suckers representing 42 varieties, 19 varieties of grapes from Russian Caucasus, 33 varieties of mangoes of recognized superiority from central India, 157 bushels of berseem from the valley of the Nile, 2,000 pounds of the famous new barley from Moravia, 200 trees of the hardy Vladmir cherry from Russia (distributed in the Northwest), and many others.

NITROGEN-FIXING BACTERIA

Extensive practical tests were made the past season with nitrogen bacteria for use in connection with the leguminous crops. Results have been even more successful than was anticipated. The several strains of bacteria sent out from the department have proved valuable even on soils containing the uncultivated organisms in abundance. The material for inoculating an acre of soil costs the department about one cent per acre and the farmers scarcely anything to apply it. The demand for the organisms is constantly increasing.

THE SOIL SURVEY

The study of soils and their management with regard to their values for producing crops has been continued. Soils vary greatly in the several states, and a general knowledge of their composition is of prime importance before the tiller can put them to their most profitable use. The Bureau of Soils is mapping the various areas to the end that residents on each may as soon as possible learn the peculiarities with which they have to deal. The department is seeking to introduce plants from foreign countries to diversify American agriculture. A knowledge of the character of the soils from which they come and on which they have been developed is imperative, and suggests the wisdom of becoming familiar with the soils as well as the climate to which these new plants are introduced.

The total area surveyed and mapped by the bureau during the fiscal year was over 29,000 square miles, and the total area surveyed at the close of the fiscal year exceeded 74,000 square miles, or 47,868,800 acres. During the past year 68 areas in the different states were surveyed. A table presents the area surveyed in 1904, and previously reported in each state, and shows that the total cost of the year's survey was $72,601.41, of which $2,377.57 was paid by state organizations. The cost of work in the field per square mile was therefore $2.21, and the average total cost per square mile, $2.50.

EDUCATING THE FILIPINOS

THE last report of the Superintendent of Education of the Philippine Islands, David P. Barrows, describes very clearly the educational policy that has been adopted for the Filipinos and the manner in which that policy is being carried out. The following paragraphs are from the report:

THE FILIPINO DIALECTS CANNOT BE DEVELOPED INTO A NATIONAL LANGUAGE

There are between 40 and 50 dialects in the Philippine Islands. The question has been frequently raised whether these Filipino languages are sufficiently related so as to fuse into one common tongue, and the Bureau of Education has received its most vigorous criticism in the United States because of its alleged attempt to supplant and destroy what might, in the opinion of absentee critics, become a national and characteristic speech. Such criticisms could only proceed from a profound ignorance of the nature of these languages and the people who speak them. All of these dialects belong to one common Malayan stock. Their grammatical structure is the same. The sentence in each one of them is built up in the same way. The striking use of affixes and suffixes, which gives the speech its character, is common to them all. There are, moreover, words and expressions identical to them all. A hundred common words could readily be selected which would scarcely vary from one language to another; but the fact still remains that, while similar in grammatical structure, these languages are very different in vocabulary—so different that two members of any two different tribes brought together are unable to converse, or at first even to make themselves understood for the simplest steps of intercourse. The similarity in structure makes it very easy for a Filipino of one tribe to learn the language of another; but nevertheless these languages have preserved their distinction for more than three hundred years of European rule and in the face of a common religion and in spite of considerable migration and mixture between the different tribes. This is as true where different populations border one another as elsewhere. In no case is there any indication that these languages are fusing. The Filipino adheres to his native dialect in its purity, and when he converses with a Filipino of another tribe ordinarily uses broken Spanish.

TO THE FILIPINOS A NATIONAL LANGUAGE IS A NECESSITY—THEY PREFER ENGLISH

For common intercourse, as well as for education, the Filipino demands a foreign speech. To confine him to his native dialect would be simply to perpetuate that isolation which he has so long suffered and against which his insurrection was a protest. Opponents of English education find no sympathizer among the Filipino people. The advantage which the possession of the English language will give him is readily understood by the Filipino, and it is fortunate that the acquisition of the Spanish tongue was largely denied him and that it never won his affection. English is the *lingua franca* of the Far East. It is spoken in the ports from Hakodate to Australia. It is the common language of business and social intercourse between the different nations from America westward to the Levant. To the Filipino the possession of English is the gateway into that busy and fervid life of commerce, of modern science, of diplomacy and politics, in which he aspires to shine.

Knowledge of English is more than this—it is a possession as valuable to the humble peasant for his social protection as it is to the man of wealth for his social distinction. If we can give the Filipino husbandman a knowledge of the English language, and even the most elemental acquaintance with English witings, we will free him from that degraded dependence upon the man of influence of his own race which made possible not merely insurrection, but that fairly unparalleled epidemic of crime which we have seen in these islands during the past few years.

Another form which criticism frequently takes, not alone in the United States, but among Americans in these islands, is that in giving the Filipino this primary education we are impairing his usefulness as a productive laborer, separating him from agriculture and the trades, making every schoolboy ambitious to become an *escribiente*, and filling their minds generally with distaste for rural life. American investors and promoters in the Philippines at the present moment are deeply disgusted with the Filipino as a laborer and are clamorous for the introduction of Chinese coolies. They claim that the Filipino hates and despises labor for itself, will not keep a laboring contract, and cannot be procured on any reasonable terms for various enterprises in which Americans desire to invest effort and money. When, however, we look a little more closely into the demands of these men, it is apparent that what they really want here is a great body of unskilled labor, dependent for living upon its daily wage, willing to work in great gangs, submissive to the rough handling of a "boss," and ready to leave home and family and go anywhere in the islands and to labor at day wages under conditions of hours and methods of labor set by their foreign employers.

Now the Filipino detests labor under these conditions. It is probably true that he will not work in a gang under a "boss," subjected to conditions of labor which appear to him unnecessarily harsh and onerous. And, looking at the matter in a broad sense, I am not sure but that those who have this people's welfare most at heart may congratulate the Filipino on this state of mind. Give him a piece of land to cultivate, especially if he can be assured that it is his own; let him choose for his labor the cool dark hours of the early dawn and evening; let him work in his own way, unharassed by an overseer, and the Filipino will make a fairly creditable showing as a laborer. We must recognize these preferences of his. I believe we should accept them and should seek to develop here in the Philippines, not a proletariat, but everywhere the peasant proprietor. Whereever we find the Filipino the possessor of his own small holding, there we find him industrious and contributing largely to the productive industry of the islands. I have in mind one beautiful little valley in the Ilokano country, famous for the quality of its tobacco, where the land-tax collections showed a year ago 2,200 small independent properties in a single municipality.

Now it is with this peasant-proprietor class particularly in mind, and trusting in the outcome of our efforts to greatly increase this class, that we must lay out our course of primary instruction. If he has his small home and plot of ground, the possession of English, the ability to read, the understanding of figures and those matters of business which affect him, and even the knowledge of other lands and peoples will not draw him from his country life and labor. It will, I hope, increase his contentment as it increases his independence, and as it raises his standard of life and comfort and increases his desires it will make him a better producer and a larger purchaser. Just now his mind is influenced by the evil example of his past instructors, who, while they taught him much that was good, taught him also that labor was vile.

THE AMERICAN PURPOSE IS TO DIGNIFY LABOR

But this attitude toward bodily labor which so disgusts Americans with the wealthy and more cultivated class appears to be not a racial feeling, but a result of Spanish training. If we look at those Malayan tribes which escaped the Spanish civilization—the Igorrotes in the north and the Moros in the south—we find that the man skillful with his tool and cunning of hand enjoys additional reputation. Mohammedanism has never despised the artisan or the tradesman, and this may somewhat account for it; but, anyway, in Mindanao and Sulu one constantly finds that even the datto, or petty king, may be a famous forger of weapons and spend many hours each day beside his anvil and bellows. I have in mind a salip, or religious leader, on the island of Basilan whose fame is widespread as a builder of boats. These facts should encourage us to hope for a change of attitude on the part of the people toward learning and practicing manual trades, even though at the present time such teaching has met little favor with the Filipinos, the young *elegantc* of Manila disdaining to soil his fingers with the grip of a tool.

THE PRESENT WORK

The latest reports obtainable from the province show that we have about 2,000 primary schools in operation. These employ the services of about 3,000 Filipino teachers. Instruction is given wholly in English. The only books used are English text, and the teaching approximates American methods. The subjects taught are English language, primary arithmetic, and primary geography, with supplementary reading in Philippine and American history and in elementary human physiology. About 150,000 children are today receiving instruction in these schools. Schoolhouses are crowded to the very limits of health and efficiency, and the Filipino teachers are teaching an average of 40 pupils.

The probable school population is a million and a half in the christianized provinces.

To properly cover the field we need a force of about 10,000 Filipino primary teachers and at least four times the amount of school-room space that we at present possess. This would make possible the primary instruction of 600,000 Filipino children, and would give to every child in the Christian population of the islands the advantage of four years of primary instruction, to be secured between the ages of 6 and 14.

High schools have been organized in every school division.

The system of public instruction introduced into the islands is thus eminently practical. The purpose of those who are directing the course of studies is to exalt the dignity of labor. Effort is made to train the eye and the hand as well as the head. In the provincial secondary schools two years' courses in mechanical drawing, wood working, and iron working are prescribed for students in arts and crafts, and give the students a fair knowledge of mechanical drawing, blacksmithing, and tool making. A more advanced course includes architecture, cabinet making, carriage building, wood turning, and pattern making. There are also courses for machinists and steam engineering.

Tools and equipment have been secured for eight different schools with wood-making machinery and for three schools in iron-working outfits. Particular attention is given to the care of instruments and tools.

Particular attention has been given to normal school work in order to train up a class of native teachers for the public schools of the islands, and this course has been pursued with eagerness by hundreds of natives, but at present there is no institution in the Philippines in which instruction is given in English of a sufficiently advanced character to fit students to enter American colleges. It is therefore proposed to offer in the normal school preparatory courses of an advanced nature adequate for the attainment of this purpose.

Another school that will have a profound influence in the development of the islands is the Nautical school. The coast line of the islands is greater than that of the United States, and as there is at present almost a total lack of railways, and the highways being in poor condition for the most part, the waters of the archipelago must continue to be used as a means of transportation. There are at present 103 students in the school, and every member of the last three graduating classes are employed (with one exception) at salaries ranging from $275 to $60 per month, one being a mate on a Japanese liner.

The course of study pursued covers a period of four years and includes English, mathematics, navigation, seamanship, geography, chemistry, and history. The students are from 22 different provinces, and, owing to their training, their Malay blood, and acquaintance with the water from childhood, make excellent seamen and are proud of their profession.

GEOGRAPHIC NOTES

CHART OF THE WORLD

THE chart of the world, 45 x 25 inches, which it was announced in the December number of this Magazine would be published as a supplement to this number has been delayed in publication, and will be published as a supplement to the February number.

WHY NO AMERICANS HAVE RECEIVED NOBEL PRIZES

PROBABLY the first thought of Americans on reading the announcement of the award of the "Nobel Prizes" of $40,000 each for 1904 was surprise that not a single American received a prize. Americans are doing noble work in the physical sciences, in literature, in medicine and surgery, in chemistry, and in the humanities. A prize of about $40,000 is awarded annually for achievements in each of these branches, and yet no American has received a prize. The reason is not lack of appreciation abroad of what we are doing in this country, but the neglect of Americans to apply for the prizes, owing to misunderstanding of the manner in which the awards are made. In the awarding of prizes only those persons are considered who are formally nominated as candidates by some institution, college, or scientific society of rank and character. Not a single American, we are informed, has yet been presented for consideration, and the impression abroad is that Americans are not interested in the prizes. The awards are made in physical sciences and chemistry by the Academy of Science of Stockholm, in medicine by the medical faculty of the university, in literature by the Swedish Academy, and in the humanities by the Norwegian Störthing. Mr W. E. Curtis in his public letter of December 26 calls attention to this mutual misunderstanding. It is to be hoped that hereafter for each prize the name of at least one American will be formally presented as a candidate. Any one can compete, but his or her name must be presented by a worthy institution.

THE STORY OF THE FLAMINGO

ONE of the most fascinating descriptions of animal life published for many years appears in the *Century Magazine* for December. It is the story of the Flamingo, by the well-known naturalist, Frank M. Chapman. For centuries queer stories have been told about this splendid bird, that it straddled its nest and did other ridiculous things, but the flamingo is shy and scarce and has always eluded the hunter. The only flamingo colony now known in North America is in an out-of-the-way island of the Bahamas. This colony Mr Chapman has been seeking for many years, but it was not till May, 1904, that he discovered its exact location. Behind a cleverly constructed blind he spent several weeks right in the midst of the colony. He secured many photographs, which the *Century Magazine* reproduces, several of them being in colors. The flamingo is the largest bird of brilliant plumage in existence. It is gregarious and exhibits a strange combination of grace and gawkiness. Since Mr Chapman's visit others have succeeded in visiting the flamingo colony with disastrous results. "Fresh meat is rarer than pink pearls in the outer Bahama Islands. Young flamingoes are excellent eating, and are consequently much sought after. As a result of this persecution on the nesting ground, they are steadily diminishing in numbers, and the passage of a law designed to protect them is greatly to be desired."

AMERICAN FOREST CONGRESS

DURING the first week of the new year a notable congress of persons and associations interested in the preservation and best use of our forests will assemble in Washington, D. C. The meeting is held under the auspices of the American Forestry Association, by whom it was called. The purpose of the Congress "is to establish a broader understanding of the forest in its relation to the great industries depending upon it; to advance the conservative use of forest resources for both the present and the future need of these industries; to stimulate and unite all efforts to perpetuate the forest as a permanent resource of the nation."

On Monday, at 12 o'clock noon, January 2, the delegates will be received in a body at the President's New Year's reception at the White House.

Morning and afternoon sessions will be held on January 3, 4, 5, and 6 in the National Rifles' Armory. On the afternoon of January 5 a special meeting will be held in the Lafayette Theater, which will be addressed by the President of the United States and other men prominent in our industrial and national life.

IMMIGRATION AND NATURALIZATION

PRESIDENT ROOSEVELT in his last message to Congress states very clearly the principle which has guided us in the making of immigration laws of the past and which should also guide us in our revision of these laws. "First and foremost, let us remember that the question of being a good American has nothing whatever to do with a man's birthplace, any more than it has to do with his creed. In every generation, from the time this government was founded, men of foreign birth have stood in the very foremost rank of good citizenship, and that not merely in one, but in every field of American activity; while to try to draw a distinction between the man whose parents came to this country and the man whose ancestors came to it several generations back is a mere absurdity. Good Americanism is a matter of heart, of conscience, of lofty aspiration, of sound common sense, but not of birthplace or of creed. The medal of honor, the highest prize to be won by those who serve in the Army and Navy of the United States, decorates men born here, and it also decorates men born in Great Britain and Ireland, in Germany, in Scandinavia, in France, and doubtless in other countries also. In the field of statesmanship, in the field of business, in the field of philanthropic endeavor, it is equally true that among the men of whom we are most proud as Americans no distinction whatever can be drawn between those who themselves or whose parents came over in sailing ship or steamer from across the water and those whose ancestors stepped ashore into the wooded wilderness at Plymouth or at the mouth of the Hudson, the Delaware, or the James, nearly three centuries ago. No fellow-citizen of ours is entitled to any peculiar regard because of the way in which he worships his Maker, or because of the birthplace of himself or his parents, nor should he be in any way discriminated against therefor. Each must stand on his worth as a man and each is entitled to be judged solely thereby.

"There is no danger of having too many immigrants of the right kind. It makes no difference from what country they come. If they are sound in body and in mind and, above all, if they are of good character, so that we can rest assured that their children and grandchildren will be worthy fellow-citizens of our children and grandchildren, then we should welcome them with cordial hospitality.

"But the citizenship of this country should not be debased. It is vital that we should keep high the standard of well-being among our wage-workers, and therefore we should not admit masses of men whose standards of living and whose personal customs and habits are such that they tend to lower the level of the American wage-worker, and above all we should not admit any man of an unworthy type, any man concerning whom we can say that he will himself be a bad citizen, or that his children and grandchildren will detract from, instead of adding to, the sum of the good citizenship of the country."

PROGRESS IN CHINA

MR WILLIAM E. CURTIS in his public letter of December 12 says that cable dispatches from China bring the news that the empress dowager has issued an edict requiring all of the soldiers in the army to wear European dress and cut off their queues. Her orders have already been obeyed in the province of Honan. The viceroy of Honan, who has been so prompt in carrying out these instructions, has a son being educated in the United States, and the youngster had not been six weeks in this country before he cut off his own queue to escape the teasing of his schoolmates. The viceroy was greatly shocked when he heard the news, because a young man without a queue in China is quite as conspicuous as a young man with one would be in the United States. It was difficult to reconcile the old gentleman to the situation, but he seems to have obeyed imperial orders in that respect very promptly.

OBITUARY

FREDERICK MAY DETWEILER, of the firm of Judd & Detweiler, printers, who have printed the NATIONAL GEOGRAPHIC MAGAZINE for 15 years, died at his home in Washington, November 9, 1904, at the age of 74. Mr Detweiler was elected a member of the National Geographic Society in 1889.

GEOGRAPHIC LITERATURE

New Physical Geography. By Ralph S. Tarr. Illustrated. Pp. xiii + 457. New York: The Macmillan Co. 1904. $1.00.

Starting with the earth as a planet, Professor Tarr, in successive chapters, treats the physiographic features of our globe, finally winding up with man, whose advance he very rapidly sketches down to the period of civilization. Being intended for secondary classes, the author very properly confines his effort to stating in clear, simple language the main results that have been generally agreed upon by the majority of investigators. He avoids the great disputed questions or very briefly considers both sides. His general aim is descriptive rather than philosophical or theoretical; for instance, he does not attempt to explain that distressingly difficult subject of high tides on opposite sides of the earth at the same time. In the main his statements are lucid and direct, and the whole book is most admirably suited for the grade of pupils that it appeals to. The "summaries," of which there are several hundred, should every one be stricken out. Predigested food is disastrous for developing powers of thought. There are several appendixes and a very useful index. C. M.

The Non-Metallic Minerals. Their occurrence and uses. By Geo. P. Merrill. Illustrated. Pp. xi + 414. New York: John Wiley & Sons. 1904. $4.00.

Although our author necessarily uses scientific symbols, his language is so simple and clear in the descriptive portions, that he has furnished a very interesting and valuable book that appeals to both the educated general reader as well as to the specialist. Usually he gives the scientific formula and composition of each mineral, its locality and its uses. In the case of the more important ones, he adds the method of manipulating and fashioning them for commercial purposes. Often he quotes from well written, popular accounts of these processes. As he gives the technical as well as common names, a person of average intelligence can readily appreciate what is said. His scheme of classification provides for 14 great groups, as carbonates, sulphates, nitrates, etc. Illustrations abound, specimens in the National Museum being freely called into service. Brief select bibliographies are found where needed. A good index ends the volume. C. M.

Dodge's Elementary Geography. By Richard Elwood Dodge. Illustrated. Pp. 231. 8 by 10 inches. Chicago, New York, London: Rand, McNally & Co. 1904. $0.75.

A splendid conception is this volume based upon, that of starting with what the child knows the most about, and gradually proceeding to other and larger notions, until the whole world is included. The young learner here begins with his home, and passes from that to the village, the town, government, land surface, water, atmosphere, transportation, and maps. Then he is led into a general description of the different portions of the globe. It is all told in a simple language, and most abundantly and beautifully illustrated. But it is to be feared that, being a university professor who prepared it, he has shot over the youthful heads. Certainly some of the maps, such as those on pages 66, 67, 129, must be too detailed for this grade of pupils. There is also too much reliance in the text on mere memory, very little of connected idea being apparent in the way of cause and effect. There is much confusion of thought on pages 68 and 69 on "heat belts" and "the hot belt." Figure 366 is Japanese, not Chinese. Yokohoma is not a fine harbor as that phrase is understood. Of course the maps are well done, and the suggestions are first class in many instances. C. M.

NATIONAL GEOGRAPHIC SOCIETY

ANNUAL MEETING

THE annual meeting of the National Geographic Society will be held at Hubbard Memorial Hall, corner Sixteenth and M streets, Washington, D.C., January 13, 1905, at 8 p. m. Eight members of the Board of Managers are to be elected to fill vacancies caused by the expiration of the term of office of the class of 1902–'4, as indicated in the list of Board of Managers published on another page of this Magazine. Nominations for these positions will be presented by a committee on nominations named by the Acting President, but additional nominations may be presented at the annual meeting by members of the Society. The annual report of the Secretary will be presented, summarizing the work of the Society during the year 1904. A lecture by Mrs W. H. Norton, wife of the United States Consul to Harput, on "Travels in Asia Minor," will be given, taking the place of the usual annual address by the President.

The Board of Managers expresses the hope that members of the Society will attend and participate in this annual meeting. The following amendment to the By-laws, which has been approved by the Board of Managers, will be presented for action by the Society:

Article IV (Officers), section 1. Omit the sentence "Of the eight members elected at each annual meeting, not less than four nor more than six shall be residents of the District of Columbia."

The section will then read:

SECTION 1. The administration of the Society shall be entrusted to a Board of Managers composed of twenty-four members, eight of whom shall be elected by the Society at each annual meeting, to serve for three years, or until their successors are elected. A majority of the votes cast shall be necessary for election.

O. P. AUSTIN, *Secretary*.

PROGRAM OF MEETINGS, 1905

THE POPULAR COURSE

January 6, 1905.—"Japan." By Baron Kentaro Kaneko, of the House of Peers of Japan, LL. D., Harvard University, 1899.

January 20.—"Russia." By Hon. Charles Emory Smith, formerly Postmaster General and Minister to Russia.

February 3.—"The Philippines." The Secretary of War, Hon. Wm. H. Taft, formerly Civil Governor of the Philippine Islands, has accepted the invitation of the Society to deliver the address on this subject, provided that the demands of public service do not interfere.

February 17.—"Manchuria and Korea." By Mr Edwin V. Morgan, U. S. Consul to Dalny. Illustrated.

March 10.—"The Panama Canal." Rear Admiral Colby M. Chester, U. S. N., Superintendent of the U. S. Naval Observatory. Illustrated.

March 24.—"The Commercial Prize of the Orient and its Relation to the Commerce of the United States." By Hon. O. P. Austin, Chief of the Bureau of Statistics. Illustrated.

March 31.—"From Lexington to Yorktown." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

April 14.—"Fighting the Boll Weevil." By Dr L. O. Howard, Chief of the Bureau of Entomology. Illustrated.

April 28.—"Niagara Falls." By Dr G. K. Gilbert, Vice-President National Geographic Society. Illustrated.

SCIENTIFIC MEETINGS

Thursday, January 12, 1905.—General subject, "The Reclamation Service." Mr F. H. Newell, Chief Engineer, and other engineers of the Reclamation Service, will describe the different irrigation works now being constructed.

January 13.—Annual meeting. Reports of officers and elections.

January 27.—General subject,
"The American Deserts."

1. Vegetation. By Mr F. V. Coville, Botanist of the Department of Agriculture.
2. Physiography. By Dr G. K. Gilbert.
3. Introducing the Date Palm. By Mr W. T. Zwingle.

February 10.—General subject, "Progress in Animal Husbandry." There will be papers by Mr George M. Rommel, Mr G. Fayette Thompson, and others of the Department of Agriculture, on the work and plans of the Department for producing distinctive American breeds of Horses, on the Angora Goat, the Fat Tailed Sheep, the Barbadoes Woolless Sheep, on the introduction of the Bos indicus, etc.

February 24.—General subject, "The Botanical Investigations of the Department of Agriculture." By Mr F. V. Coville, Botanist, and members of his staff.

March 3.—General subject, "Progress in Plant Physiology." Papers by Dr George T. Moore and others on "Inoculating the Ground," "Protecting Municipal Water Supply Systems," etc.

March 17.—General subject,
"Japan."

The Geography of Japan. By Mr Eki Hioki, First Secretary of the Japanese Legation.

The Fisheries of Japan. By Dr Hugh M. Smith.

Agriculture in Japan. By Mr David G. Fairchild.

April 7.—General subject,
"Forestry."

Papers by Mr Gifford Pinchot, Mr Overton Price, and others, of the U. S. Bureau of Forestry, and a paper on Japanese Bamboos, by Mr David G. Fairchild.

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THE
NATIONAL
GEOGRAPHIC
MAGAZINE

RUSSIA*

BY HON. CHARLES EMORY SMITH

FORMERLY MINISTER TO RUSSIA AND EX-POSTMASTER GENERAL

AT the very outset I shall throw myself on your kind indulgence. I hope you will not think me one of that rash company, more numerous in enrollment than polite in name, that rush in where angels fear to tread. Believe me, I know full well the difficulty and the delicacy of my venture, and have known it from the start. The only excuse that can be pleaded in extenuation of the hazard is that the persuasiveness of your committee, if not greater than the restraint of my warning good sense, was at least more potent than the firmness of my resolution.

Russia just now is at the best a tempting but perilous theme. Half a century hence it will be possible to look back through the clear perspective of years and measure the true relations of the events of today to a new career of progress and greatness. But in the present hour we see the portents without the promise, and Russia is shadowed by the gloom of the clouds without the gleam of the sun. The inherent difficulties of the subject are enhanced by the personal position of the speaker. There are phases on which it is becoming that I should speak with reserve—perhaps, to use an Hibernianism, with silence—on the principle, "the wisest word I ever said was the word that wasn't spoken." It is true that the diplomatic trust was laid down some years ago, and the easier, if not higher, diplomacy of American free speech was resumed; and you will permit me to amend the words of the poet and say:

More true joy returned Marcellus feels
Than exiled Minister with a Senate at his heels.

But there are obvious proprieties which follow the minister even in retirement; yet while they should be respected, there is still large room for free expression. I did not hesitate to say in St Petersburg, looking out from the Foreign Office upon the broad Alexander Place, from the center of which rises the stately and splendid memorial shaft to the first Alexander, that there were things in Russia which we of the United States, in the best spirit of sincere friendship, could wish otherwise, and I do not hesitate to say it here. Russia does not resent honest criticism. She criticises herself. Her statesmen are sensible of her relations to the spirit of the age and are conscious of her difficulties and shortcomings. She only asks—and does she not rightly ask?—that judgment shall be pronounced in good faith, and with an honest purpose to be fair. She is often silent when in justice to herself she ought to speak. To my mind it is a mistaken policy, for while it avoids answer where answer would sometimes be difficult, it leaves a hundred misrepresentations to pass unchallenged; but, mistaken or not, it is the tradition of a power which meets political hostility or thrifty sensationalism with disdain.

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*An address to the National Geographic Society, January 20, 1905.

And certainly, if there be a grateful sense of invaluable service, we of America ought at least to seek to be fair. We never can be deaf to the call of humanity. We cannot be blind to the errors which have followed unfortunate counsels. We must deal with living issues and with present events as truth requires; but we can and we ought to fulfill the obligations of duty and speak the voice of judgment in the spirit of honest and manly friendship. For Russia was our truest friend in the hour of our supreme trial. Tradition has handed down this impressive truth, and both the public archives and the unwritten records confirm it. You know that in the critical period of the civil war, when we were threatened with French and English intervention, the Russian fleet appeared in the harbor of New York. The testimony is not wanting which discloses the inspiration and the purposes that placed it within that friendly and protecting proximity. There has been some dispute over this question, and the attempt has been made to discredit the sympathetic attitude and the actual service of Russia, but the evidence is clear and conclusive.

Shortly after the war began in 1861, the Secretary of State, Mr Seward, addressed the European governments, setting forth the American position. Prince Gortchakoff, the great Russian chancellor, wrote these words in reply:

"The Union is not simply in our eyes an element essential to the universal political equilibrium. It constitutes besides a nation to which our august master and all Russia have pledged the most friendly interest, for the two countries, placed at the extremities of the two worlds, both in the ascending period of their development, appear called to a natural community of interest and of sympathies, of which they have already given mutual proofs to each other."

That unequivocal answer, made at the very beginning, plainly indicated the friendly attitude of Russia. Through the Russian government, with its special sources of information, President Lincoln's administration was kept advised of what the other governments of Europe were meditating and proposing. Official France was hostile. The French people were sympathetic, as they had been from the days of the American Revolution. But Louis Napoleon, who was then on the throne, had his own designs, which were disclosed in Mexico. Official England, unlike the official England of these later years, was also hostile. A large proportion of the English people, many of whom in Lancashire deeply suffered on account of our war and the deprivation of cotton, were right in their instincts. The great and good Queen was our steadfast friend. But Palmerston and Lord Russell, and even Mr Gladstone, whom we have all so greatly admired and honored, looked on our struggle with unkindly thought.

In the early days of the war Secretary Seward was apprised, through the legation at St Petersburg, that the French and English governments had come to an understanding for joint action respecting the American war involving the possible recognition of the Southern Confederacy. When, soon afterwards, the French and English ministers appeared at the State Department together his information prepared him to meet them. Knowing their object, Mr Seward politely avoided receiving them jointly and adroitly turned one off with a dinner invitation while he saw the other alone. But the joint movement of the two governments went on. Joint action on neutrality pointed the way to joint action on intervention. Who could measure the dangers of such a portentous step? Would Mr Lincoln's government, already absorbed in a life-and-death grapple with a giant rebellion, also accept the gage of war with the united strength of the two great nations of western Europe? Could it hope to prevail against these combined perils, or would the unequal struggle leave the Union irretrievably divided and broken?

That was the startling menace. Russia's feeling was known, and before the blow was struck it was important to know what Russia would do. Louis Napoleon took steps to ascertain—I have reason to believe through an autograph letter to the Czar, Alexander II, advising him that the French and English governments believed the time had come when they ought to mediate or intervene between the North and South, and inviting him to join in the movement. The Czar declined to do so unless Mr Lincoln's government should request it. But the menace continued, and thereupon the Russian fleet steamed into the bay of New York and cast anchor within sight of Trinity spire. All the world knew what that act meant; Louis Napoleon knew, and the threatened intervention never came.

This chapter of past judgments does not justify any misjudgments now, but it does impose the obligation of seeking to pronounce present judgments in a fair and just spirit. Russia is engaged at this hour in a foreign war which has thus far been full of surprises and disasters, and she is at the same time in the throes of a domestic agitation which, let us hope, will lead to a great advance for the Empire. No treatment of the general subject can ignore these phases, and they will be the better understood if we look at them against the background of the national structure and organization and character.

Russia is a country of extraordinary contrasts; of imperial splendor and of widespread poverty; of the magnificence of the court and of the squalor of the moujik; of the stately grandeur of St Petersburg or the picturesque orientalism of Moscow, and of the dreary, dead level of dull and endless plains; of the highest culture and the broadest ignorance; of the boundless treasures of the unequaled Winter Palace, with its 500 opulent rooms, or of imposing St Isaac's, with its malachite columns and its golden dome, and of the boundless destitution of almost uncounted millions; of the literary genius of Poushkin and Gogol, of Tourgenieff and Tolstoi, and of the dense illiteracy of the masses; of the pictorial wonders of Verestchagin and of the most primitive agricultural and industrial arts—in a word, of the highest development of grace and culture in social life and of the deepest penury and hardship on the broad national field.

And as it is a country of extremes in condition so it has been portrayed in extremes of opinion. On the one hand it has been painted in the blackest of colors. It has been pictured as a land of Tartar barbarism and of Muscovite tyranny, where the Siberian exile is the expression of all cruelty and the Jewish proscription as the embodiment of all intolerance and persecution. Its government has been described as a despotism tempered by assassination. On the other hand it has been delineated in some quarters as a benign and patriarchal system, where the sole thought of the Little Father is the welfare of the millions of his people, and where the acknowledged grace of the throne is accepted as the proof of the general practice. It is easy to produce striking effects with strong pigments. There would be a ready and startling sensationalism in a vivid picture of terrors and in a flaming outburst of rhetoric. But, as generally happens, the truth lies between the extremes. It is not all black or all white, but it has its lights and its shadows, and the faithful delineator must sacrifice the bold outlines of a fanciful sketch for the more subdued tones of historic verity.

The character of autocratic rule manifestly depends very much on the character of the autocrat. It is true that in these modern days even the autocrat is largely the creature of conditions. Imperial will is molded and circumscribed by historic tendencies, by overmastering public opinion, and by the spirit of the age. But, on the other hand, the currents of national development fall into the eddies of personal impulse. With the vast machinery of a great modern nation autocracy becomes bureaucracy. But the autocrat makes the bureaucrats, and so determines the trend. There are settled traditions and tendencies in Russia, but they are affected and modified by the dominant temper and influence of the hour. When Russia passed from the scepter of Nicholas I to that of Alexander II she advanced from the virile and robust imperialism of an iron dictator to the progressive and expanding liberalism of an enlightened ruler. When she passed from the control of Alexander III to that of Nicholas II she went from the secure, harsh, rigorous sway of a firm, self-poised, austere monarch to the turbulent reign of a kind, well-meaning, and uncertain sovereign.

The present Czar is conscientious and devoted in public purpose and amiable and exemplary in personal life. He has been surrounded by conflicting influences, and each of the opposing forces has appeared at one time or another to be dominant. The Czar's disposition and tendency have been liberal, as was indicated in the noble impulse which convoked The Hague Conference. If at times there has been a backward movement it was because reactionary elements outside of the throne gained a temporary ascendancy, and if lamentable errors plunged the empire into a war for which she was so illy prepared, it was because irregular influences, outside of the ministry, that were mistakenly trusted, gave evil counsels.

As a rule, Russian ministers are not personal favorites, but are often able statesmen, marked for their places by capacity and fitness. Their commission comes, not from title of nobility, but from the higher title of brains. Curiously as it may cross the prevailing conception of the Russian system, many of them have sprung directly from the ranks of the people. M. de Giers, the astute Minister of Foreign Affairs, who succeeded Gortchakoff and who so long guided the foreign policy of his country, did not inherit rank or fortune. Equally without rank was Vishnegradski, the Minister of Finance, a remarkably able man, whose range of vision covered the finance of all nations, who carried on his table the first free-silver bill just as it was lying on the desks of the American Senate, and whose acute and profound observations, if they could have been properly reported, would have instructed and startled the American people.

His successor, de Witte, who was so long the master spirit of the Russian government, who then fell into disfavor, and who in the present crisis appears to be again rising into favor and ascendancy, is no less a man of the people. He made his first mark as a subordinate railway official, and was rapidly promoted until he became the most powerful minister of the empire. Many others might be named to illustrate the same truth of high individual advancement without title or favor and solely on merit. Russia has ministers, but no ministry. There is no united, coherent, responsible governing body. Each minister acts only for himself and is responsible only to the Emperor. Oftentimes ministers antagonize and intrigue against each other. Witte and Plehve were at swords' points. Thus the bureaucracy lacks unity, coöperation, and efficiency. It is disorganized and discordant. Sometimes an individual minister shows tremendous energy in the administration of his department, but the coördinated work which gives united force and strength is missing.

Below the chiefs the system has the vice of venality. It is this which has sapped the strength of the navy and impaired the efficiency of the army. It is this which has provided the gun of inferior range and imparted structural weakness to the battleship. Russia has prodigious resources and almost unlimited power, if it can be made available. She has the giant's strength, but the giant's strength enfeebled by a vicious system and an improvident sloth. There is personal valor and symptomatic defect. There is the brilliant dash of the daring Makaroff, but a strange paralysis and fatality of the fleet. There is the skillful generalship of Kuropatkin, with the patience of Fabius and the fight of Marius, but a want of preparation which leaves him always with inferior numbers. There is the intrepid courage of the heroic Stoessel and his fire-tried troops at Port Arthur, which has excited the admiration of the world, but there is at the same time the lack of equipment which crippled his defense. The fighting quality and the latent power are there, but reconstruction is needed to bring the fruits.

In some directions Russia has made remarkable advances in recent years. The energetic and far-reaching policy of Witte as Finance Minister, with its striking results, has been the subject of great praise and great criticism. It had two central and fundamental conceptions. The first was to make Russia wholly self-sustaining and industrially great by a system which should protect and foster her own manufactures. The second was to concentrate all power and control in the hands of the government by substituting state for local taxation, by the promotion of state ownership of railroads, and by the creation of great state monopolies, like those in spirits, drugs, and kindred articles. The fruits have been tremendous, though possibly in some directions open to question.

The industrial progress of Russia in the face of serious obstacles has been signal. Within ten years the number of hands employed increased from 1,318,048 to 2,098,262 and the value of the output more than doubled. The chief industries are textiles and mines and metals. Cotton manufactures have been rapidly developed. The consumption of cotton has increased in little more than a decade from 117,000,000 kilograms to 257,000,000, and the number of spindles in operation is about 7,000,000. In iron manufacture Russia holds the fourth place among the nations, ranking next to Germany and ahead of France. From 1892 to 1900 the annual production of metallic articles rose in value from 142,000,000 roubles to 276,000,000.

The advance was so rapid that after 1900 there was a reaction, followed by an industrial crisis. In his report on the budget for 1902, M. Witte ascribed the depression to a succession of bad harvests and a withdrawal of foreign capital, caused by the Boer war and the resulting stringency in the European money markets. Doubtless also the extraordinary development had engendered speculation and overproduction.

The great growth had come in spite of deficient transportation, of ignorant and debilitated labor, and of the meager purchasing power of the mass of the people. Russia has made much headway in recent years in remedying the first defect. From 1892 to 1902 more than 17,000 miles of railroad were opened. Within the Russian Empire, not including Manchuria, 4,100 miles of railway were under construction in 1901. With his early training, M. Witte naturally made railroad development a vital part of his great and vigorous policy of national upbuilding—a policy which was largely instrumental in this industrial and commercial expansion. In ten years the passenger traffic on the Russian railroads has multiplied almost five-fold and the freight traffic more than eight-fold.

But there is a deeper and more radical difficulty. It is suggested in the observations of Prince Mestschersky, the bold and brilliant editor of the *Grashdanin*, of St Petersburg. Writing in 1901, he said: "It would be more logical for the development of mills and works to begin with the development of the people, so as to create a consumer, than to begin with the development of factories, mills, and railroads for a people wanting in the very first elements of prosperity." His conception is that the hope of Russia lies in an improved condition and advancement of the peasantry. The weakness of the Russian system is in the backwardness of agriculture. The agriculturists constitute 78 per cent of the population, and for the most part are surrounded by the most unfortunate conditions. Their implements are of the most primitive character. The crop yield per cultivated dessiatin is lower than in any other country in Europe. Belgium, which ranks first, produces an average of 128.5 poods of grain per des siatin, a pood being equal to 36 pounds, while the Russian average is only 38.8 poods. Even this disparity does not indicate the full gravity of the case, for Russia produces less grain per head than is consumed per head in other countries, and at the same time she is the second grain-exporting country in the world.

This fact tells the story of her own deprivation, and it is emphasized by some particular inquiries. It is estimated that the people on the farms require from 20 to 25 poods of grain per head for their support and that of their live stock during the year, and these figures are much below the consumption in other lands. Yet it often happens that in a considerable number of provinces the harvest is far less than even this meager requirement. The result is that Russia is frequently afflicted with famines, that the consumption of bread has fallen off about 70 per cent, and that the number rejected from the military service through physical disqualification has increased 14 per cent within seven years. During the great famine of 1891, which extended over ten provinces, more than a million horses perished, leaving many of the peasants with no means of cultivating the land. The crop failure of 1898 did not cover so wide an area, but it was even worse where it prevailed. It left over 12,000,000 people in abject destitution and more than 8,000,000 suffering from actual famine. In 1900 and 1901 famine again desolated the land. All this entails chronic impoverishment. The arrears in the redemption of the land on the part of the former serfs are constantly increasing, and the economic conditions which affect them are growing worse.

The amelioration of this situation lies at the foundation of the present agitation for political reform and enlarged freedom. Undoubtedly, the popular restiveness has been quickened by the war and its demonstration of the defects of the existing system; but the recent striking manifestations are only the sudden culmination of a movement which has been in progress for some time. To understand it we must grasp some fundamental elements of the Russian polity. Russia presents a curious paradox. Theoretically it combines the most extreme autocracy with the most extreme democracy. The great body of the people are divided and organized into "mirs," or communes. The mir is what we would call the township organization. Land is held in common and is apportioned for cultivation among the families of the mir according to their respective needs. The communal assembly makes the apportionment and the periodical redistributions; it governs other questions relating to the land, the harvest and other local affairs, and its government is more like that of the New England town-meeting than anything else. As far as it goes, it is a perfect democracy. All the people assemble on the village green, under the presidency of the starosta, or village elder, and determine all questions within their scope by a majority vote.

The mirs are grouped into cantons or districts, and the districts elect representatives to the zemstvos, which are the provincial assemblies. Without going into minute details, all classes are represented. The ultimate elective bodies are not large in proportion to the total population, but they are distributed among peasants, individual landholders, merchants, nobles, and urban electors. In 361 district assemblies, with 13,196 members, 38 per cent were peasants, 35 per cent nobles, 15 per cent merchants, and the remainder officials or priests. The provincial assemblies or zemstvos have over 1,200 members in all, and they operate chiefly through executive committees, of which the nobles constitute far the larger proportion. The mir deals with the land, farming, and the immediate local concerns. The district assembly, which corresponds more nearly with our county organization, looks after roads, schools, sanitary matters, and like questions. The provincial assemblies have the care of prisons, hospitals, charities, main roads, mutual insurance, and other subjects of more than local range.

The zemstvos were among the reforms instituted by the liberal and enlightened Emperor, Alexander II. They were created in 1864, and sprang from a commission appointed for the purpose of "conferring more unity and independence on the local economic administration." Theoretically they went far toward establishing a system of local autonomy, but practically they have been largely nullified by the overruling power of the provincial governors, who stand for the bureaucracy. Their authority and independence have from time to time been curtailed. Nevertheless, in their form as local representative assemblies, even with their limited electorate and scope, they furnish the basis and nucleus for wider representative institutions. Their liberal spirit and independent purpose have been the most characteristic features in the new reform movement.

In January, 1902, the present Emperor created a Central Committee of Agriculture, under the presidency of M. Witte, to consider the measures necessary to meet the existing difficulties. This body was supplemented by local advisory committees, which, rather by local choice than by central design, were made up largely from the zemstvos. The majority of these committees made some significant recommendations. They urged that elementary education should be increased; that zemstvos should be established in provinces where they did not exist, and made more representative, with larger powers; that the system of village communes should be reconstructed so as to give the peasants equality with others, and that free discussion of economic questions should be allowed.

A little later a memorandum was presented to the Czar recommending that their old powers should be restored to the zemstvos, that they should be arranged in groups, and that these groups should elect delegates to a central or national zemstvo.

The effect of these various demonstrations was seen when in February, 1903, the Czar issued a manifesto holding out high promise. He declared that the fundamental principle of property in common must be held inviolable, but he said that relief for the individual must be found, and added: "A reform is to be effected by local representatives in provincial government and district administration." These assurances were neutralized when the influence of Witte waned and the reactionary Plehve gained more power; but they and the manifestations which led to them were the forerunners of the more impressive demonstrations that have recently been witnessed. The meeting of the zemstvo presidents at St Petersburg in November last was in many respects the most remarkable assemblage in Russian history. It was almost like a states general. It put forth a declaration of principles which is equivalent to a demand for a national representative assembly with political voice and rights and with a direct advisory part in legislation and government. It plainly declared that there is an estrangement between the government and the people; that it is due to fear of popular initiative, and that it has led to great wrongs in the arbitrary bureaucratic system which has come between the throne and its subjects. It calls for the overthrow of this centralized administration of local affairs; for independent legal tribunals for the protection of personal rights; for free speech, free press, and free conscience; for equal civil and political rights for peasants; for the greater independence and extension of the zemtsvo institutions, and for national representation through an elective body which shall participate in legislation.

These demands are unprecedented in Russia, and their concession would inaugurate a revolutionary change. It was not to be expected that they would all be granted at once. The ukase which the Czar has issued in response to this call marks a large advance. It charges the Council of Ministers with the duty of framing measures to secure equal rights to the peasants; to safeguard law and unify judicial procedure for the protection of personal rights; to assure a more independent and complete administration of local affairs through local institutions; to deal with state insurance for workmen; to reduce the discretionary authority which has bred the administrative process; to promote larger religious toleration, and to provide greater freedom of the press. This is a long step in liberalism. It does not establish representative institutions; it does not provide for elementary education; but it does look toward a larger local control of local affairs, toward the relief of the peasants from the rigorous conditions which surround them, and toward the removal of the arbitrary restrictions which now burden the people; and the ukase itself distinctly treats these reforms as the beginning of "a series of great internal changes impending in the early future."

In considering the character, trend, and methods of these changes the peculiar conditions of Russia must ever be remembered. Whatever advance has been made there up to this time has come from the top and not from the bottom. The great mass of the people are simple, illiterate, and inert. The disturbances which have occurred from time to time have been mostly on the surface. The great deeps have not been moved, though the caldron is now seething as never before. The new industrial conditions of recent years, to which reference has been made, have produced a class of workmen and artisans in the cities who are more alert than the supine peasantry and who are the source of the present discontent and uprising.

The whole fabric of society, it must also be borne in mind, rests upon the church which is the very foundation of the state and to which in its ritual and observances all, from the Czar to the humblest moujik, are supremely devoted. The first need of the people is economic improvement and their release from the harsh conditions of their restricted communal life. The report of Witte on the elevation of the peasant contemplates some reconstruction of the mir and the opening of broader callings and opportunities to those who are practically bound to the soil. It is urged with force that real social emancipation cannot come without political enfranchisement. The one will undoubtedly promote the other, and under the quicker impulse of these later days the nation is moving forward to both.

Russia is passing through the dark valley of deep trials. She is paying the appalling cost of grievous mistakes; but enormous as that cost is, it will still be cheap if, through these bitter experiences and this new awakening, the great empire shall be put upon the higher pathway of wiser counsels and liberal advancement. The history of Russia is a varied story. It is illuminated with the progressive measures of the great Emancipator. It is darkened with the shadows of Kishinev and the Finnish oppression. The far-reaching reforms which are now dawning on the nation give promise of a new and more hopeful era. Russia has prodigious recuperative power. She was prostrate after the Crimean war, but soon recovered her strength. She was humiliated and straitened after the Turkish war, but started again upon a new career. She is patient, tenacious, and persistent; she has the traditions and the indomitable faith which have come down from Peter the Great; she has the vast though dormant resources of imperial domain and power; and if through the disasters she is now suffering she shall throw off the shackles of the bureaucracy that have weighed her down and come to share the progressive spirit of the age, she will through present tribulations and final regeneration enter, as we hope she may, on a new and brighter epoch.

MARINE HYDROGRAPHIC SURVEYS OF THE COASTS OF THE WORLD*

BY GEORGE W. LITTLEHALES

THE accumulated stock of marine hydrographic knowledge in its availability for the construction of navigational charts of the coasts of the world is divided into four classes for the purposes of this communication. Upon the accompanying world chart the extent of coast line comprised within each of these four classes is indicated by appropriate symbols depicting the coasts that are completely surveyed, those that are incompletely but serviceably surveyed for purposes of navigation, those that are explored for purposes of navigation, and those that are unexplored for purposes of navigation.

It should be made clear with reference to those coasts which are classed as being completely surveyed that, excepting in rare instances, no greater completeness

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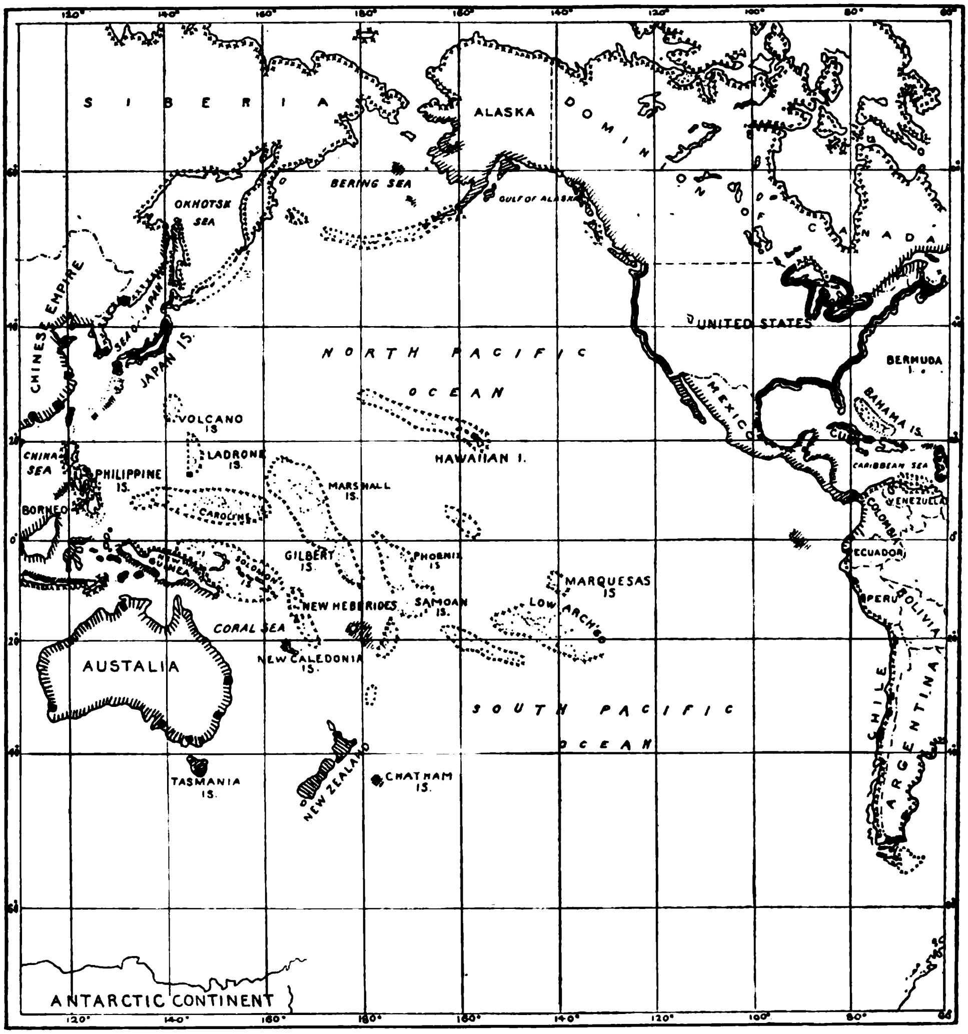
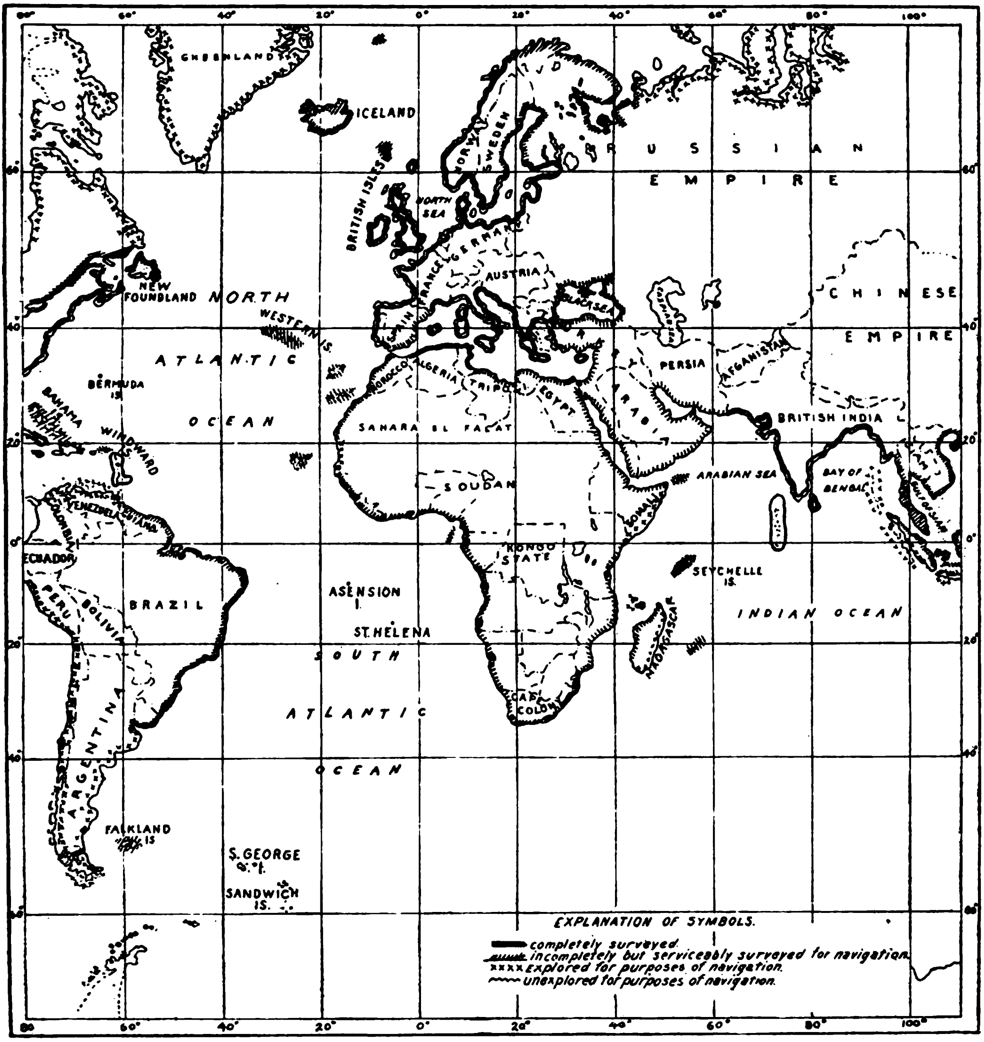
*An address to the Eighth International Geographic Congress, September, 1904.


SIBERIA
ALASKA
DOMINION OF CANADA
BERING SEA
GULF OF ALASKA
OKHOTSK SEA
CHINESE EMPIRE
SEA OF JAPAN
JAPAN IS.
UNITED STATES
NORTH PACIFIC OCEAN
BERMUDA I.
BAHAMA IS.
MEXICO
CUBA
CARIBBEAN SEA
VENEZUELA
COLOMBIA
ECUADOR
PERU
BOLIVIA
CHILE
ARGENTINA
VOLCANO IS.
LADRONE IS.
CHINA SEA
PHILIPPINE IS.
MARSHALL IS.
HAWAIIAN I.
BORNEO
CAROLINE
GUINEA
SOLOMON
GILBERT IS.
PHOENIX IS.
MARQUESAS IS
NEW HEBRIDES
SAMOAN IS.
LOW ARCH.
CORAL SEA
NEW CALEDONIA IS.
AUSTALIA
SOUTH PACIFIC OCEAN
TASMANIA IS.
NEW ZEALAND
CHATHAM IS.
ANTARCTIC CONTINENT
120°
140°
160°
180°
160°
140°
120°
100°
80°
60°
40°
20°
0°
20°
40°
60°

Map showing the Condition of the Coast Surveys of the World

has been attained in the portrayal of the forms and characteristics of the strip of the sea bottom which borders the coast than is yielded by measurements obtained by dropping a sounding-plummet at close intervals, and that nearly all coasts and harbors, whatever may be the initial completeness of the surveys, require reëxamination in the course of time to disclose the altered conditions that are produced by natural agencies and artificial developments.

It will not escape attention that while there is a comparatively small total extent of completely surveyed coast which bounds the world's seats of enlightenment and wealth in the Northern Hemisphere, the extent of coast that is unex-


GREENLAND
ICELAND
BRITISH ISLES
NORTH SEA
NORWAY
SWEDEN
GERMANY
FRANCE
AUSTRIA
SPAIN
BLACK SEA
CASPIAN SEA
RUSSIAN EMPIRE
CHINESE EMPIRE
PERSIA
AFGANISTAN
ARABIA
BRITISH INDIA
ARABIAN SEA
BAY OF BENGAL
MOROCCO
ALGERIA
TRIPOLI
EGYPT
SAHARA EL FALAT
SOUDAN
KONGO STATE
SOMALI
SEYCHELLE IS.
MADAGASCAR
INDIAN OCEAN
CAPE COLONY
NEW FOUNDLAND
NORTH ATLANTIC OCEAN
WESTERN IS.
BERMUDA IS.
BAHAMA
WINDWARD
VENEZUELA
GUIANA
COLOMBIA
ECUADOR
PERU
BOLIVIA
BRAZIL
ARGENTINA
CHILE
FALKLAND IS
ASENSION I.
ST. HELENA
SOUTH ATLANTIC OCEAN
S. GEORGE I.
SANDWICH IS.
EXPLANATION OF SYMBOLS.
completely surveyed
incompletely but serviceably surveyed for navigation
xxxx explored for purposes of navigation
unexplored for purposes of navigation
80° 60° 40° 20° 0° 20° 40° 60° 80° 100°
60° 40° 20° 0° 20° 40° 60°

Map showing the Condition of the Coast Surveys of the World

plored for purposes of navigation is yet smaller and is almost confined to the frozen regions of the earth, which are unvisited by commerce and unpeopled. A prominent feature of the investigation and one which can not fail to bring a realization of the great responsibility resting upon navigators and the skill and caution required of them in the navigation of coastal waters in nearly all parts of the world is the immense extent of the coast line which, while sufficiently known to be approached, can not be navigated with security.

It is in general useless for the nautical surveyor of the present day to devote himself to the rapid reconnaissance of a coast in the manner that proved so acceptable in the middle of the last century, for such a survey would not now prove beneficial with reference to any but the unexplored regions.

The parts of the world that have been completely surveyed and the parts about which, from the standpoint of the marine hydrographer, nothing is known are equally beyond our concern at present, for on the one hand the needs of commerce and navigation have been met and on the other hand commerce and navigation have as yet no needs. It is to the vast extent of the coasts of the world concerning which marine hydrographic knowledge exists in varying degrees of incompleteness that we should address ourselves with a view of directing attention to the faults which may be corrected and to the wants which may be supplied.

Leaving our own completely surveyed Atlantic seaboard, we come at once among the oldest colonies in the Western Hemisphere and in a sea of great present and prospective importance, upon coasts concerning which there is no adequate information for the construction of charts and the guidance of shipping. The coasts of the Island of Haiti, outside of the more important ports and harbors, are very imperfectly charted. Our knowledge of the harbors of Cuba has been lately much improved, but the sections of coast connecting these harbors is not yet well represented. No better portrayal of the north coast of South America from Panama to Trinidad has ever been afforded than that which resulted from a cursory examination made in the early part of the last century. There are doubtless many places along this coast where future surveying operations will develop useful anchorages for the improvement of commerce and the safety of vessels. The ports leading to many of the important maritime centers of Brazil have been efficiently surveyed, but the general approaches to the coast are not completely developed. In the Rio de la Plata navigation has been rendered fairly safe, but of the intervening coast, until the Strait of Magellan is reached, it may only be said that, beyond several isolated local surveys lately executed by the Argentine government, nothing has been done since the general examination in 1830. The efforts of British and Chilean hydrographic surveyors have effected much improvement during the last generation in the charts of the Strait of Magellan and throughout the waters of Chile, although the whole labyrinth of channels in southern Chile is still inadequately known for the purposes of the many steamers that are continually passing through; and with reference to the entire western coast of South America, the efficient surveying operations have clustered around local developments that were taking place here and there, leaving no general survey of the whole coast by which it can be laid down in sufficient detail.

The surveys of the immediate approaches to Panama, although imperfect, are serviceable; and the same may be said of the Central American and Mexican coasts which connect the Republic of Panama with the completely surveyed Pacific coast of the United States. Of the coastal waters in the northeastern Pacific much more is known in relation to the waters of the British dominions than with reference to the Alaskan coasts. Indeed the marine hydrographic surveys of Alaska are as yet very incomplete, especially in the Aleutian Islands, where many coasts remain barely explored. Russian Siberia and Korea have for the most part only been hydrographically explored; but nearly all of the coasts of the Empire of Japan have been completely surveyed and charted, and the coasts of China, together with the China Sea, where British surveying ships have worked continuously for fifty years to put in their right positions the multitude of rocks and shoals which encumber this region, are now well known. Much, however, yet remains to be done on the eastern and southern confines of this sea. Only the most important harbors and sections of coast in the Philippines and the Dutch East Indies have been well charted. Parts of Tonquin and the southern, and especially the eastern, passages into the China Sea need much additional examination in detail. Australia and New Zealand are enveloped with good nautical charts, which are constantly being amended as new developments give rise to increased needs for more detailed surveys, and most of the important harbors and the thickly inhabited maritime sections have been quite completely done. The Coral Sea, or what is termed the outer passage between Australia and the Indian Ocean, is now much improved beyond its former state, owing to the necessity of providing more direct routes than those which were formerly followed, and most of its dangerous reefs are now set down in the charts. British India is better surveyed than many other parts of the best-known coasts of the world, and the shores of the Red Sea and the Mediterranean have been minutely surveyed excepting in a few parts where minor details are not now important.

Of the coast of Africa, aside from that portion which fronts on the Red Sea and the Mediterranean, the most vaguely charted portion is that of Somaliland, and the most completely charted parts are embraced in that well-surveyed section, including Madagascar, which extends southward from Zanzibar around the Cape of Good Hope to the regions of Table Bay. The whole of the west coast can now be laid down with closeness to its true position on the face of the globe, and while some parts of it have been merely explored by the nautical surveyor, many other parts are better known, and some of the harbors and off-lying islands have been surveyed with considerable approach to completeness.

The coasts of Europe, excepting the Spanish peninsula and those parts bordering on the Arctic Ocean, are completely surveyed, and an important center of activity in marine hydrography has for many years existed in Great Britain, resulting not only in elaborate surveys of the waters of Great Britain and Ireland, but in meeting the demand for reliable nautical charts in every part of the British Empire and in whatever other parts of the world British trade has been active or springing up.

Nearly a century has now elapsed since the close of the era of discoveries among the vast groups of islands and coral reefs with which the immense area of the Pacific Ocean is studded, and the chaotic state of geography at that time, in which it was sometimes impossible for discoverers to return to the islands discovered, has given place to a state of order at the present day. The ships of all the great maritime nations have contributed in a greater or less degree to this advance by fixing the correct geographical positions of individual islands, by surveying harbors and anchorages in the various groups, and by disproving the existence of many supposed rocks and dangers which were set down in the older charts from reports of former navigators, often doubtless based upon misleading appearances of the sea.

But important as is the surveying work that has already been accomplished in the Pacific, it is only the beginning of that which is to come. There is scarcely an island group in the whole of Oceania that is completely charted. The great work that remains to be done here ought to progress more rapidly in the future, since all these lands have at length been parceled out among leading nations of the world.

THE WONDERFUL CANALS OF CHINA

BY U. S. CONSUL GEORGE E. ANDERSON, HANGCHAU, CHINA

THERE are several features in the canal system of China, especially of the Imperial or Grand Canal, which can be studied with profit by the people of the United States. One of these is the use of the canal for the production of food in addition to its uses as a means of transportation. Allied to this is the use of the muck which gathers at the bottom of the waterway for fertilization. Another is the use of every particle of plant life growing in and around the canal for various purposes.

The Chinese secure a vast quantity of food of one sort or another from their canals. To appreciate the exact situation with respect to the waterways, it must be realized that the canals of China cover the plain country with a network of water. Leading from the Grand Canal in each direction are smaller canals, and from these lead still smaller canals, until there is hardly a single tract of 40 acres which is not reached by some sort of a ditch, generally capable of carrying good-sized boats. The first reason for this great network is the needs of rice cultivation. During practically all of the growing season for rice the fields are flooded. Wherever a natural waterway can be made to irrigate the rice fields it is used, but, of course, from these to the canals or larger rivers there must be waterways. Where natural streams cannot thus be adapted the Chinese lead water in canals or ditches to the edge of their fields and raise it to the fields of rice by the foot-power carriers which have been described so often by tourist writers. However the water is supplied to the rice, it is evident that there must be a waterway leading to the field and back to a principal stream, which is generally a branch canal. These waterways naturally take up a considerable portion of the land, and the Chinese make as profitable use of them as of the land itself.

The first use of the waterways is for fishing. The quantity of fish taken from the canals of China annually is immense. The Chinese have no artificial fish hatcheries, but the supply of fish is maintained at a high point by the fact that the flooded rice fields act as hatcheries and as hiding places for the young fish until they are large enough to look out for themselves. In the United States this fish propagation annex to the canals is probably neither possible nor needful in view of the work done by the state and national bureaus; but in China it is nothing less than providential.

Along the canals in China at any time may be found boatmen gathering muck from the bottom of the canal. This muck is taken in much the same manner that oysters are taken by hand on the Atlantic coast In place of tongs are large, bag-like devices on crossed bamboo poles, which take in a large quantity of the ooze at once. This is emptied into the boat, and the process is repeated until the boatman has a load, when he will proceed to some neighboring farm and empty the muck, either directly on his fields—especially around the mulberry trees, which are raised for the silk-worms—or in a pool, where it is taken later to the fields. From this muck the Chinese farmer will generally secure enough shellfish to pay him for his work, and the fertilizer is clear gain. The fertilizer thus secured is valuable. It is rich in nitrogen and potash and has abundant humus elements. This dredging of the canals for fertilizers is the only way by which the Chinese have kept their canals in reasonably good condition for centuries. The fertilizer has paid for itself both ways. Recently there were complaints filed at Peking that the ashes from the steam launches plying on the canals were injuring the muck for fertilizing purposes, and the problem has been considered a serious one by the Chinese government.

In addition to securing fertilizers from the canals, and thus keeping the canals in condition, the farmers help keep them purified by gathering all floating weeds, grass, and other vegetable debris that they can find upon them. Boatmen will secure great loads of water plants and grass by skimming the surface of the canal. The reeds growing along the canals are used for weaving baskets of several grades and for fuel. In short, no plant life about the canal goes to waste.

Where there are so many canals there is more or less swamp ground. In China this is utilized for the raising of lotus roots, from which commercial arrowroot is largely obtained. There is no reason why much of the waste swamp land in the southern portion of the United States should not be used for a similar purpose, and the commercial returns from a venture of this sort in that part of the country ought to be satisfactory. Where the canals of China widen, by reason of natural waterways or for other reasons, the expanse of water not needed for actual navigation is made use of in the raising of water nuts of several varieties, especially what are known as water chestnuts. These nuts are raised in immense quantities. They are, strictly speaking, bulbs rather than nuts. They are rich in arrowroot and are prolific, an acre of shallow water producing far more than an acre of well cultivated soil planted in ordinary grain or similar crops. These nuts, also, could be produced to advantage in the United States where there is land inundated for the growing season to a depth which will give ordinary water plants a chance to thrive and which is not capable of being drained for the time being. The nuts or bulbs are toothsome when roasted, and are wholesome, but probably would be more valuable in the United States for the manufactured products which can be secured from them.

There are duck farms all along the canals in China. These are profitable. Chinese canals, as a rule, considering the population upon them and their varied uses, are cleaner than canals in the United States. There are few if any factories to contaminate them. The Chinese use of certain sewage for fertilization also prevents contamination to a great extent. The canal water is used for laundry, bath, and culinary purposes indiscriminately. A canal in the United States could never be what it is in China, but the Chinese have a number of clever devices and ideas in connection with their canals which can be adopted in the United States with profit.

The Grand Canal system in China has existed in almost its present shape since about the time Columbus discovered America. The Grand Canal itself, extending from Hangchau to Pekin, is about a thousand miles long. Much of it is banked with stone, and all of it is in such condition that with the expenditure of a little money the system could be put upon a modern and effective basis. As it is, the canal handles practically all the internal trade of China, and this trade is far greater than its foreign trade. The coming of railroads will affect the canals somewhat, but not so much as may be imagined, for the railroads will very largely build up a trade of their own. A little money will make China's canal system in the future what it has been in the past, the greatest on earth.

GEOGRAPHY AND CULTURE*

IT has been often remarked how much the various wars of the past ten years have educated the people in geography. Southeastern Europe, South Africa, the West Indies, the China coast, Japan, Korea, and Siberia have in their turn been "discovered" by millions of people who had previously entertained very hazy notions as to their existence on the face of the earth. Yet, rather singularly, there are more complaints today concerning the ignorance of geography among all classes, high and low, than ever before.

The universities, colleges, and schools are under more criticism than hitherto for their alleged failure to give to geography, broadly considered, its proper place in their courses of study. A year or two ago Mr Bryce delivered an address before a geographical society in England in which he emphasized the importance of geography in any scheme of education or culture. Lord Salisbury, not long before he died, surprised his countrymen by saying that many of their misconceptions concerning international questions originated in the misleading scales of the maps of different countries and continents. It needs but a moment's reflection, indeed, to be convinced that while people in general have lately increased their stock of geographical knowledge, owing to these sensational wars and the closer jostling of the nations, we have only begun to realize how ignorant we are concerning the earth we live upon.

The great extent of the average person's real ignorance of geography is almost invariably shown whenever he begins to probe into some question of history or international politics. Very soon he discovers, rather to his surprise, that the whole matter may rest upon some simple fact of geography. A classic illustration is the discovery of America, which was the immediate result of the closing of the old Mediterranean trade routes to the Orient by the conquering Turks. Most people have a general idea that Columbus was seeking a new way to the Indies when he made his historic voyage, yet they never get far enough along to understand clearly why he was seeking that route. They do not know anything about the ancient routes through Asia Minor and around the Black Sea and what the Turks did to them. History cannot be intelligently understood, of course, without a clear knowledge of the geography of history. Huxley believed this so strongly that he never read a book of history or travels or international politics without an atlas by his side for constant reference. Yet most of the histories that are published even in our time are singularly deficient in good maps, and, strange to say, the great Cambridge series of modern history, planned by the late Lord Acton, contains not a single map in the first four volumes already printed.

Certain facts of geography account for very much of what goes on in our own time. The Boer war cannot be thoroughly understood unless one knows the peculiar relation that South Africa bears to India and Australia from the British point of view. The war between Russia and Japan is an insoluble mystery until one observes the position of Korea and the Sea of Japan with reference to the Russian outlet upon the Pacific. Why is Russia today such a despotism? Even that question should be answered in the light of the geography of the Russia of Ivan the Terrible and Peter the Great. What makes Ireland so poor? The climate, due to the island's geographical position with reference to the trade winds of the Atlantic, cannot be ignored in seeking an explanation of Ireland's position the past sixty years.

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* From the *Springfield Republican*, December 18, 1904.

Why does Japan wish to expand in territory? We need only study the physical character of Japan to know. Why is Nevada such a backward state, and why is Arizona such an unpromising candidate for statehood? Here again geography can give an answer. Why did the negro race in central Africa remain for ages in an isolated, uncivilized, undeveloped condition? To answer that fully one must take account of the Sahara desert on the north and the great forest belt which follows in a wide, deep margin the west African coast.

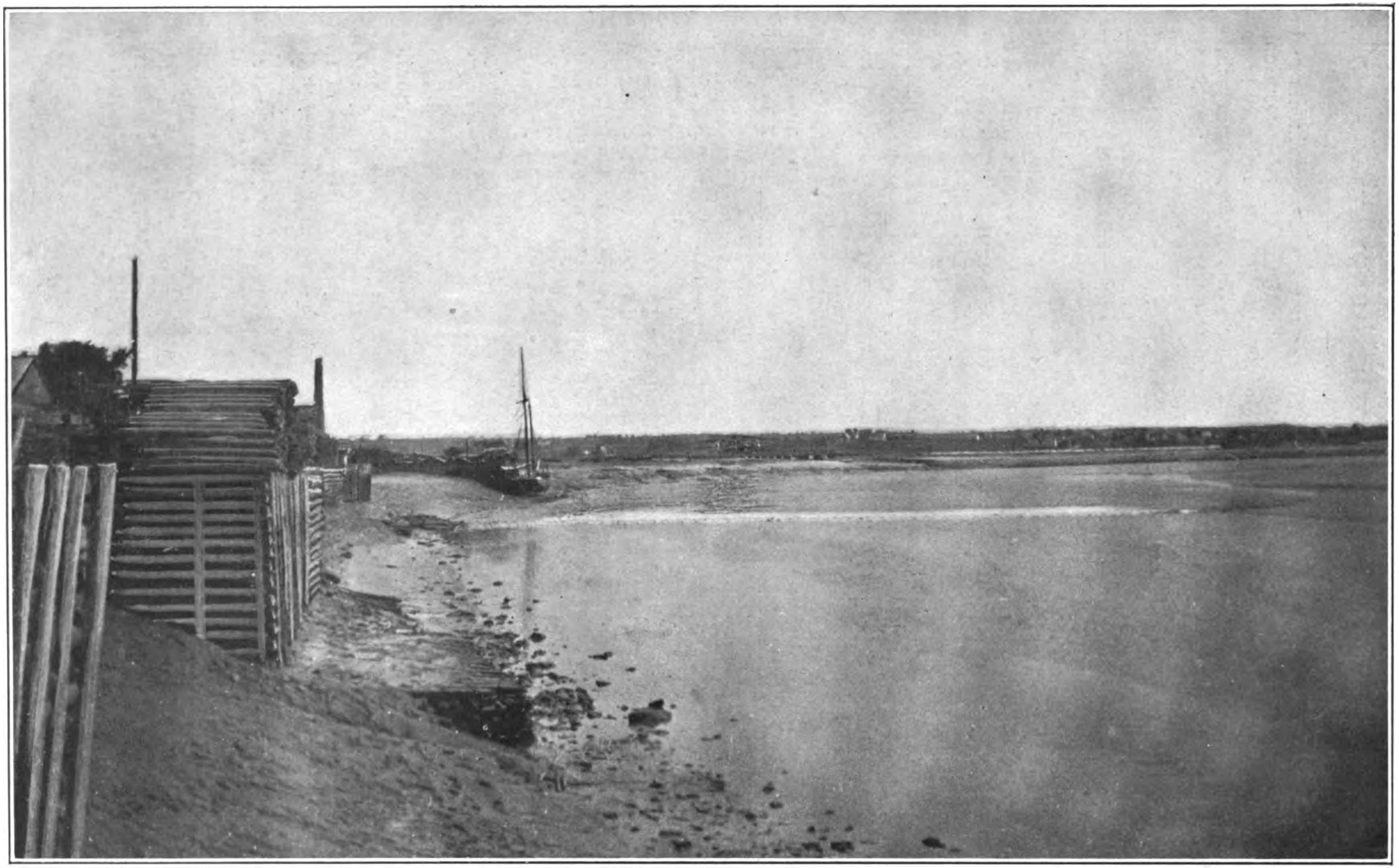
Yet geography, with most people, has always been a "dry" study. Just why this is so might be discussed, perhaps, so as to yield interesting conclusions. Possibly, as taught for so long in the past, it was too unreal, too make-believe, too artificial to arouse interest, especially the interest of those with little imagination. The north was always up, the south down, the east at the right and the west at the left of the page. To be sure, the earth was round, with flattened poles, because the book said so; yet what one in a thousand, since the globular condition of the earth was accepted as a fact by the civilized world, has easily comprehended the significance of the great and small circles as to distances over continents and oceans? Then, too, the misconceptions one may draw from the ordinary maps are enormous, as Lord Salisbury intimated so strongly. We are so accustomed to large maps of our little corners of the earth that when we see maps of Asia, or Africa, made of the same size, our ideas as to the extent of those regious go hopelessly astray. When some one comes along and tells us how many Frances or Germanys or Englands could be embraced within the boundaries of Tibet, we are well-nigh upset. When President Roosevelt talks about "the mastery of the 'Pacific,'" not one American in 500 can conceive the proposition in terms of geography, and geography has a tremendous lot to do with international politics.

It is said that geography is still largely a monopoly of the German schools; in England, they are poorly off, according to the complaints lately made in the London press. It is encouraging, however, to note a growing insistence everywhere upon fuller geographical knowledge and more nearly correct geographical ideas. No one can be a man or woman of real education and culture in the future to whom geography, in no narrow sense, is virtually a closed book.

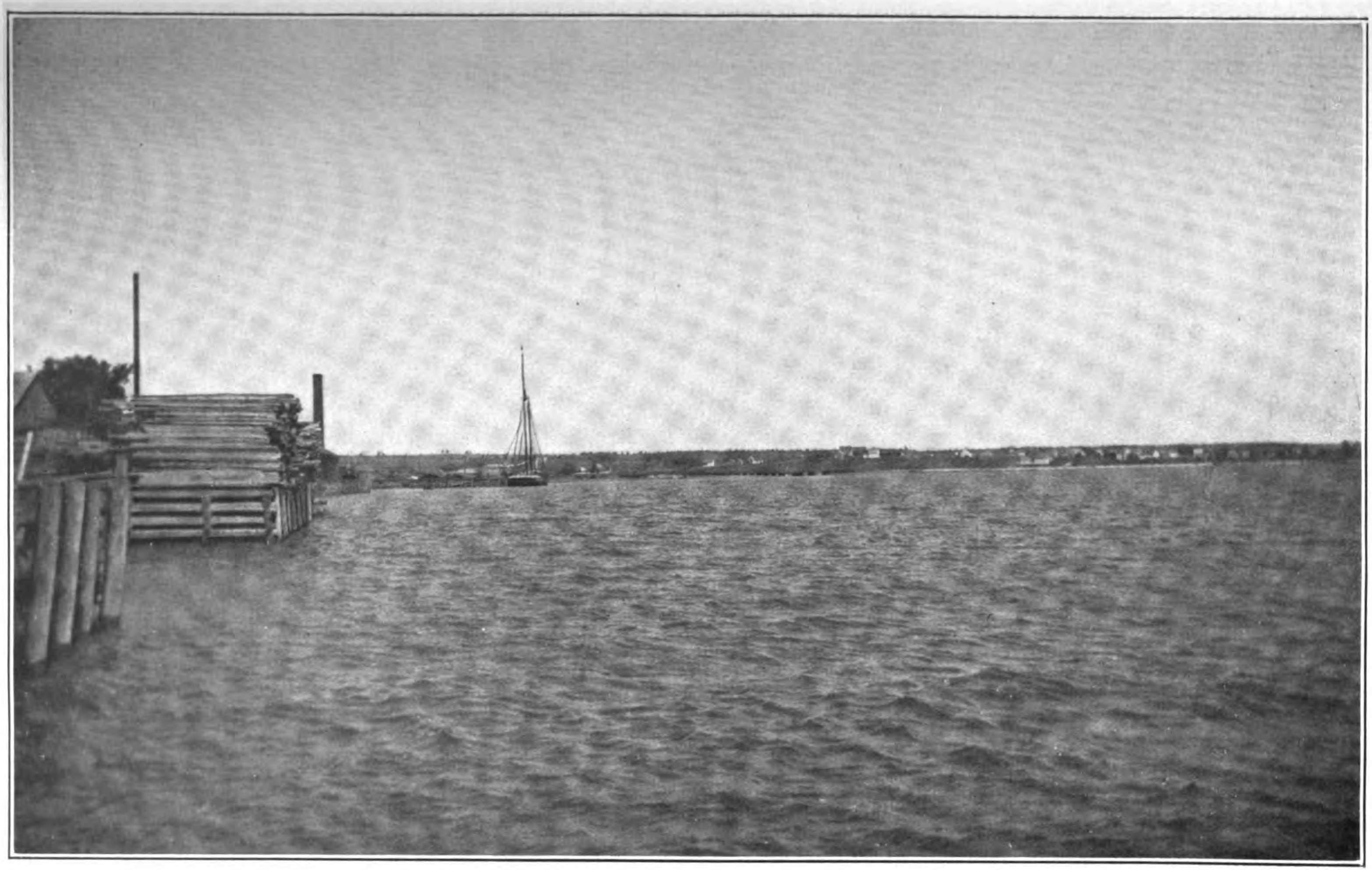
TIDES IN THE BAY OF FUNDY

THE accompanying plates of high and low tides in the Bay of Fundy are enlarged from photographs taken by Mr Roland Hayward, of Milton, Mass., in the summer of 1903. The views are of double value—first, in showing tides of unusual strength, and, again, in being taken from the same points for both high and low tides. The following general statements are from an article by Chalmers in the Report of the Geological Survey of Canada for 1894 (1895):

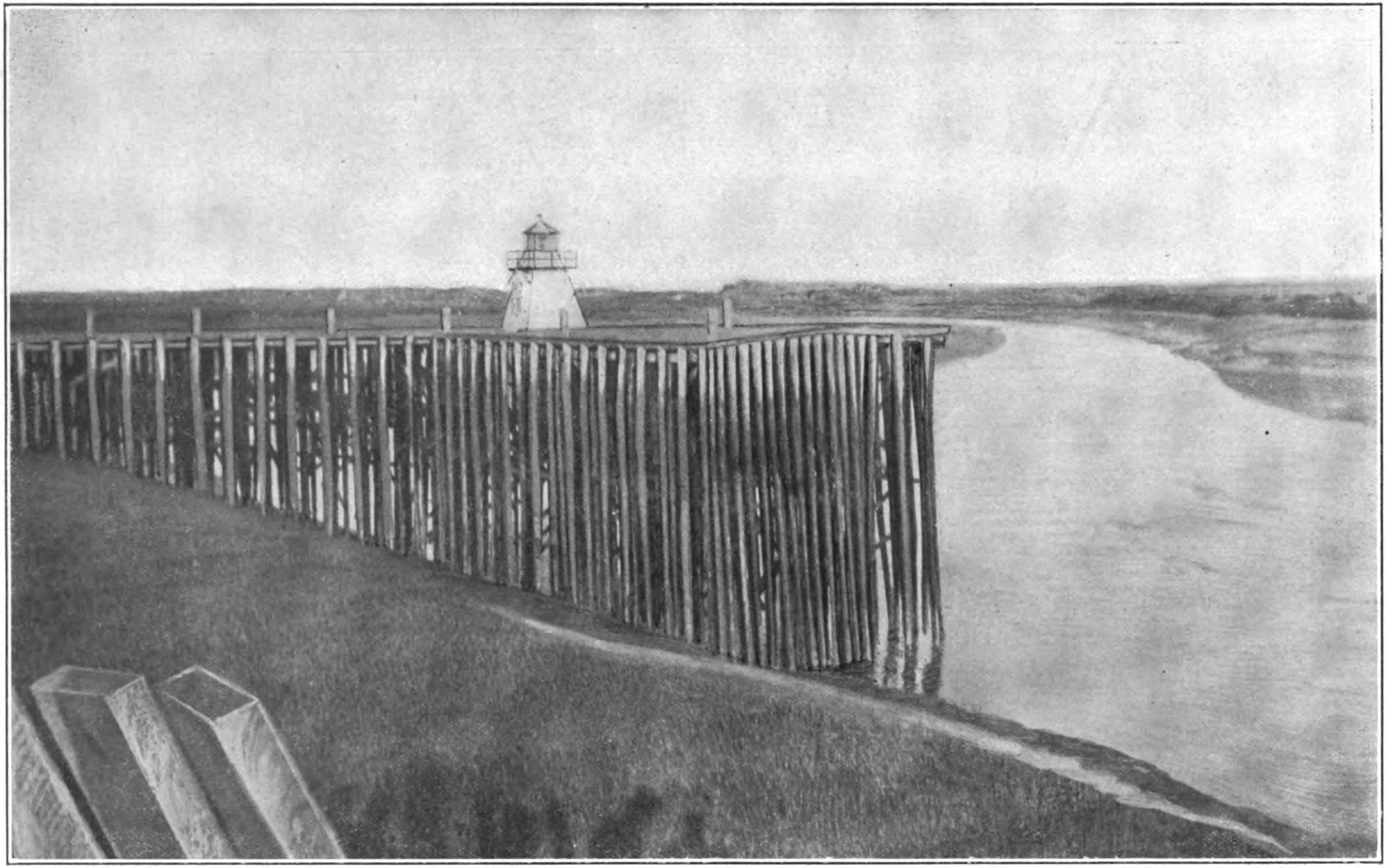
The mouth of the bay is 48 miles wide and from 70 to 110 fathoms deep. The bottom rises at a rate of 4 feet to a mile for 145 miles, to the head of the bay. On the coast near the mouth the spring tides vary from 12 to 18 feet. Within the bay the spring and neap tides are as follows: Digby Neck, 22, 18; St John, 27, 23; Petitcodiac River, 46, 36; Cumberland Basin, 44, 35; Noel River, in Cobequid Bay, 53, 31. The last named is, according to Chalmers, the greatest tidal range authentically



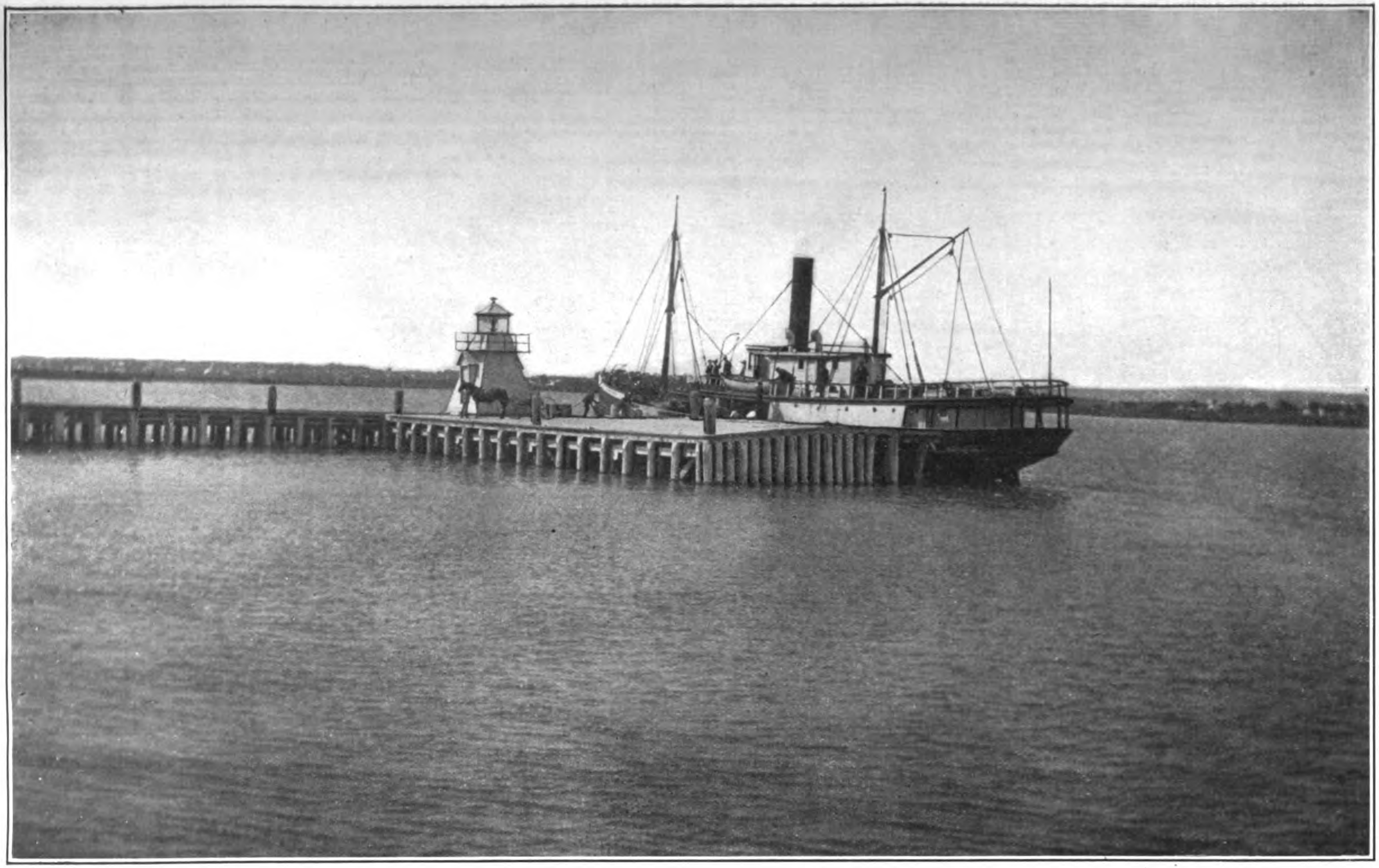
The Bore coming up the Petitcodiac River at Moncton, N. B.



High Tide on the Petitcodiac River at Moncton, N. B.



Low Tide on the Gaspareaux River, Wolfville, N. S.



High Tide on the Gaspareaux River, Wolfville, N. S.

reported for any part of the bay. At the head of the bay high tide is about 20 feet above mean sea-level. Low tide is as much below. The tidal bore is seen in Maccan River, entering Cumberland Basin; but it is stronger in Petitcodiac River, entering Shepody Bay. It is best seen at Moncton, where the first pair of views is taken.

Mr Hayward gives the following details:

The Petitcodiac River turns at Moncton from a northeast to a southeast course, then entering the northwestern branch of the bay. The mud flats are three-quarters of a mile wide at Moncton. The retiring tide leaves them covered with ripple-marks. The low-tide view was taken at 10.05 a. m., August 9, 1903, looking easterly. Here the foaming and roaring bore advances against a swift fresh-water stream, rising rapidly. Its height was about 3½ feet; its progress was 5 miles an hour. High water, as shown in the second view, is reached about three hours after the arrival of the bore.

The second pair of views was taken at Wolfville, on the eastern arm of the bay near the mouth of the Gaspareaux River, on September 7 and 8, 1903. The piles in the pier are stated to be 60 feet high. The great inconvenience attending so strong a range of tide may be imagined.

It may be well to recall a feature of the Bay of Fundy tides set forth by M. S. W. Jefferson a few years ago in his articles in this magazine, to the effect that the Fundy tides are practically synchronous from the mouth to the head of the bay, while the Chesapeake tides, for example, are progressively later and later from mouth to head; but the estuaries at the head of the Bay of Fundy have progressive tides, as in the Petitcodiac. The synchronous "swash" tides of the bay may be easily imitated in a model of an irregular shore on which a shallow sheet of water lies. Tide-like oscillations in the water may be made by an oscillating plunger; and when the proper period of oscillation is chosen, the tide in a funnel-shaped bay will have small range at the mouth and great range at the head, and the time of high or of low tide will be essentially synchronous all along the bay sides. At the same time a neighboring bay of different form may have progressive tides whose advancing waves may assume the form of a bore if the proper variation of breadth and depth of channel is given.

W. M. D.

FRENCH CONQUEST OF THE SAHARA*

BY CHARLES RABOT

EDITORIAL SECRETARY OF "LA GEOGRAPHIE," MEMBER OF THE COUNCIL OF SOCIÉTÉ DE GEOGRAPHIE DE PARIS

TO traverse the Sahara from north to south, to join Algeria to the Sudan through the great desert of North Africa, and to subjugate the nomads who wander through that immense region has been one of the principal aims of France in recent years, and one which she has at length attained at the price of long and persevering effort. The hostility of the Touaregs was for a long time an obstacle. Established in the oases scattered over the Sahara, these Berber fanatics and brigands were accustomed to scan the whole desert, and as soon as they spied a caravan to fall upon it to rob and massacre. Often, too, they were wont to attack the tribes of the extreme south of Algeria, who had already submitted to French influences.

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* An address to the Eighth International Geographic Congress, September, 1904.

After the disaster to the Flatters mission in 1881 and several other outrages committed by the Touaregs, the French military authorities had postponed for a while all further desire to penetrate into the Sahara and remained simply on the defensive.

During this period of official inaction, M. Foureau accomplished a series of very fruitful expeditions in the desert regions south of Algeria. From 1883 to 1897 he traveled no less than 13,200 miles, of which 9,600 were in regions entirely unknown.

Not only did M. Foureau notably augment our geographic knowledge by this journey, but he inaugurated a mode of traveling which has been very fruitful for the exploration of the Sahara. Instead of being accompanied by a heavy caravan, like preceding missions, this traveler adopted the mode of life and transport of the natives, taking with him only a few faithful Arabs. His little troop was mounted on "meharis," used by the Touaregs—rapid camels, which are to the ordinary camels of the caravan what race-horses are to cart horses. Thanks to the mobility of his caravan, M. Foureau could perform long raids without being attacked by the Touaregs. Meanwhile, from 1890 to 1892, a French officer, Colonel Monteil, accomplished the crossing of the Sahara from Tchad to Tripoli by the caravan route.

The French, however, had never abandoned the idea of a junction of Algeria to the Sudan. In 1896 a member of the Geographical Society, M. Renoust des Orgeries, encouraged this idea by giving the society $50,000 to organize an expedition to carry out this program, and in 1899 M. Foureau received permission to traverse the Sahara and to make his way through the desert to the French possessions in Central Africa. To ensure the safety of his caravan and to compel a respect for the French flag from the brigands of the Sahara, the government gave M. Foureau a numerous military escort, commanded by Major Lamy.

This Foureau expedition started from Ouargla (in South Algeria) at the end of October, 1898, and a year later (November 2, 1899) arrived at Zinder, at the northeast extremity of French Sudan. In the April following, after having gone round Lake Tchad by the north and east, the expedition had effected a junction with the French troops upon the Chari, the principal affluent of the Tchad.

The march of the expedition was very slow and painful in consequence of the enormous caravan track behind it. Part of its camels soon succumbed to the fatigues of the journey, and it was impossible to purchase new beasts of burden from the nomads. The Touaregs, confident of their strength, threw themselves at various times against the little troop; but, having learned in these encounters that they could not be victorious, they abandoned active hostilities and limited themselves to creating a complete dearth of supplies around the explorers. It was only through the energies of M. Foureau and of the military chiefs that the expedition was able to get along at all.

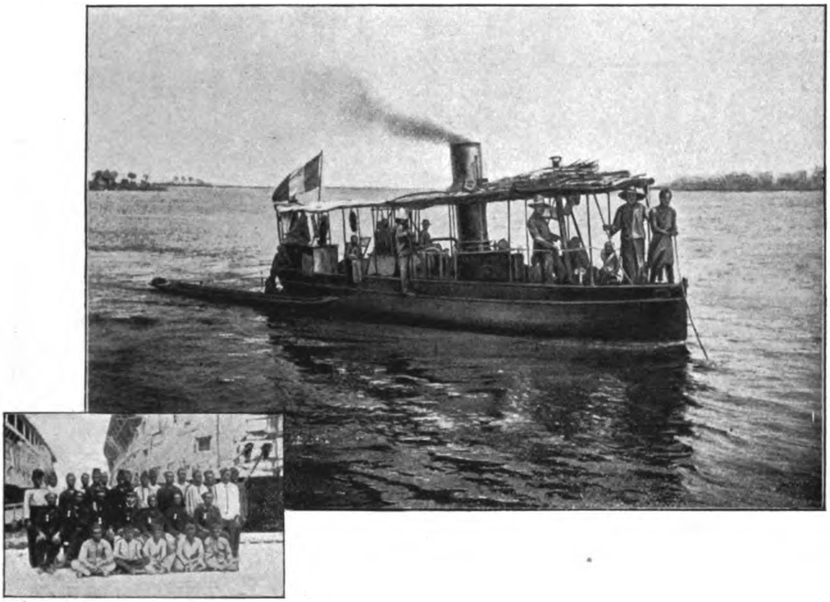
The slowness of this journey has had very favorable results from the scientific point of view. It has permitted M. Foureau to acquire a very complete knowledge of the country and to collect a very rich harvest of observations of interest to all fields of geography. A great work setting forth these scientific observations is in course of publication and is being offered to all important geographic societies.

The Foureau mission opens a new era in the French penetration of the Sahara.

At the moment when this expedition was setting out the French government gave up the defensive attitude, and, abandoning the merely defensive policy observed since the Flatters mission in 1881, decided to extend further southward the zone of French influence, which then did not pass 30° latitude north. On the 28th of December, 1899, M. Flamand, a naturalist, was instructed to make a study of the region which it was proposed to annex, and was attacked at In-Sala. Immediately the French troops advanced on their "meharis," commanded by Captains Germain and Pein, two brilliant Sahara officers. Some months later the French occupied the chain of oases of Gourara, Touat, and Tidikelt, more than 300 kilometers in length, which runs along the subterranean courses of rivers descending from the high plateaus of Morocco and Algeria. In this way the French had advanced nearly half the distance from the Mediterranean to the northern curve of the Niger at Timbuctoo.

This military advance has had interesting results from the point of view of geography. An excellent map on the scale of 1:250,000 has been made by Lieutenant Nieger of the whole region of Touat and Tidikelt, hitherto imperfectly known. Moreover, M. Flamand has published interesting notes on the morphology and geology of this part of the desert. To ensure protection of the oases thus acquired against the incursions of the Touaregs, the military authorities recognized the necessity of abandoning the old mistake of simply remaining on the defensive. In order to assure the tranquillity of the country, it was necessary at the first attack from the brigand tribes to pursue them vigorously through the desert, and not to give up until a sharp lesson had been inflicted.

This result could only be obtained by



Scenes on Lake Tchad

a very mobile and acclimatized troop. It was decided therefore to undertake the creation of troops mounted on "meharis" and composed of natives under the command of French officers. This organization was inspired from that of the famous "dromedary companies" instituted by Bonaparte in Egypt, and by that of the "camel corps" recently adopted in the Sudan by the British army.

Since that time the French troops have been on an equality of speed and mobility with the Touaregs, while their superiority of arms ensures victory even against superior numbers.

These Saharan troops once organized, the officers commanding the extreme southern posts upon the Algerian frontier undertook long raids into the Sahara, traversing and surveying vast unknown regions and at the same time acting as a vigilant police. On March 26, 1901, the Touaregs having come to rob the people of Tidikelt, Lieutenant Cottenest started with 130 native troops and reached the mountain mass of the Hoggar and inflicted a severe lesson upon the brigands, returning to In-Sala after having traveled 1,000 miles in 62 days in a country entirely hostile. The same year, from the 16th of May to the 15th of June, Major Laperrine explored the Mouydir, a plateau surrounded by valleys from 200 to 300 meters deep and containing an abundance of water, wood, and excellent pasture.

Some time later, in 1902, Lieutenant Guilho-Lohan returned to the Hoggar plateau and pushed south to 22° latitude north. In 1903 Lieutenant Besset effected a raid of 750 miles in the south, and some months later Major Laperrine, accompanied by Professor Gautier, directed a new reconnaissance in the Mouydir and the Ahnet. At the same time Captain Pein effected a raid round the Temassinine in the region situated farther east.

These different expeditions have completed and transformed the situation of the Sahara. The Touaregs, finding themselves chastised for the smallest act of rapine and always overtaken in their haunts, have now given their submission to Captain Metois, commanding at In-Sala. Only the tribe of Azguers, which wanders in the eastern Sahara, has as yet refused to accept French domination.

Accordingly a new and decisive operation was undertaken. At the commencement of February, 1904, Major Laperrine, quitting In-Sala at the head of a troop of "meharistes" and taking his route south, succeeded in traversing the Sahara and meeting a second troop of "meharistes" which had set out from Timbuctoo. In this way was effected the junction of Algeria with the Niger, previously accomplished by M. Foureau, but now by a more eastern route.

In this expedition Major Laperrine was accompanied by an astronomer, M. Villate. From a geographical point of view these raids have had very important results. The officers who have commanded them have brought back precise methods and numerous observations of interest. As a result of the reconnaissance in which he took part in 1903, Professor Gautier has made a geological map of Mouydir and Ahnet, in the very center of the Sahara.

The junction of the parties from In-Sala and Timbuctoo took place on April 18, at the well of Tioniaoune by 20° 10′ north latitude. The party from Algeria, under Commandant Laperrine, had come through Inzize and Timissao. After he succeeded in joining hands with the southern party, the commandant pushed a little farther south, as far as the well of Tin Zaouatem by 19° 57′ north latitude, but soon resumed the journey northward to In-Sala, following a fresh itinerary. Scarcity of water and the heat (it was in May) made the homeward journey very trying, part of the men having to travel as far as 320 kilometers with hardly any water. News received from this expedition points to the extension southward of the volcanic formations discovered by M. Gautier in Mouydir.

Thanks to M. Foureau and to the officers commanding the posts of the extreme south of Algeria, considerable progress has been accomplished by the new method of exploring the Sahara by the employment of "mehara" (singular of "mehari"). This camel can bear, besides his rider and his arms and accoutrements, 30 days' victuals and two skins of water. With this load he can march from 3 to 3¼ miles an hour and amble at a pace of 5 miles. In the raid executed in 1903 by Commandant Laperrine and Professor Gautier 69 miles were traversed in 29 hours.

One has no need for anxiety as to feeding the mehari; the desert flora suffices for its food, and in summer it can endure 5 days without drinking, while when plants are green it can go without water for 18 or 20 days.

By this method of penetration in the Sahara, M. Foureau and these French officers have there accomplished progress as important as that effected by Nansen in his Arctic exploration. By adopting the means of locomotion and of existence of the Polar peoples, the Norwegian explorer gained a memorable victory. In the same way, by borrowing from the inhabitants of the Sahara their mode of life and locomotion, the French have triumphed over the obstacles which the nature of the soil and of the inhabitants had set against the exploration of the great desert of northern Africa.

OBSERVATIONS ON THE RUSSO-JAPANESE WAR, IN JAPAN AND MANCHURIA*

BY DR LOUIS LIVINGSTONE SEAMAN

THE Japanese soldier has been taught how to treat his intestines, and consequently his intestines are now treating him with equal consideration. His plain, rational diet is digested, metabolized and assimilated. It is not an irritating, indigestible, fermenting mess, acting as a local irritant and producing gastritis, duodenitis, enteritis, colitis, hepatitis, and the long list of inflammatory intestinal processes with which we were all so familiar in the hospital wards at Camp Alger, Chattanooga, Tampa, Cuba, Porto Rico, Montauk Point, &c., in 1898.

The great hospitals are there, interne, contagious, and infectious departments, their conspicuously empty beds voicing more eloquently than words the most important lesson of the war. A few cases of diseases of the respiratory system are found—colds, bronchitis, and an occasional pneumonia—contracted through exposure in fording rivers, exhaustive marches, and bivouacking on wet ground, a few more of typhoid (I saw only three in Manchuria), occasionally one of dysentery, and a number of cases of beri beri, that former scourge of oriental armies.

But of all the many thousands gathered in these institutions there were but a few medical cases, and of these scarcely a baker's dozen came under the heading of "Diseases of the digestive system." Therein lies one of the greatest secrets of the Japanese success. Napoleon never made a more truthful statement than when he said: "An army fights on its belly." The Japanese have that belly, and they take good care to keep it in fighting order, not by insulting it three times a day by cramming it with material totally unsuited to the soldier's necessities, thereby exciting irritations and disease, but by supplying it with a plain, palatable, easily prepared and easily digested ration that can be thoroughly metabolized and converted into the health and energy that make its owner the ideal fighting machine of the world today.

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*Abstract of an address to the National Geographic Society, December 9, 1904. Those desiring further information on this subject are referred to Dr Seaman's instructive book recently published by D. Appleton & Co.

The organization of the medical department of the Japanese army and navy is modeled after that of the Germans, with many added improvements. Too much praise cannot be bestowed upon the medical department of the army and navy for their splendid preparatory work in this war. The Japanese are the first to recognize the true value of an army medical corps. The medical officer is omnipresent. You will find him in countless places where in an American or British army he has no place. He is as much at the front as in the rear. He is with the first screen of scouts with his microscope and chemicals, testing and labeling wells so the army to follow shall drink no contaminated water. When the scouts reach a town he immediately institutes a thorough examination of its sanitary condition, and if contagion or infection is found he quarantines and places a guard around the dangerous district. Notices are posted, so the approaching column is warned, and no soldiers are billeted where danger exists. Microscopic blood tests are made in all fever cases and bacteriological experts, fully equipped, form part of the staff of every divisional headquarters.

The medical officer is also found in camp, lecturing the men on sanitation and the hundred and one details of personal hygiene—how to cook, to eat, and when not to drink, to bathe, and even to the direction of the paring and cleansing of the finger nails to prevent danger from bacteria. Up to August 1, 9,682 cases had been received at the reserve hospital at Hiroshima, of whom 6,636 were wounded. Of the entire number up to that time only 34 had died.

It is the rule of the Japanese surgeons at the front to do little or no operating except in cases of extreme emergency or where hemorrhage threatens immediate death. All cases are treated by the application of the first aid dressing and then sent to the rear as quickly as possible, thence by hospital boat or transport to the base hospitals in Japan.

If the testimony of those conversant with the facts can be accepted, supplemented from my own limited observations, the loss from preventable diseases in the first six months of this terrible conflict will be but a fraction of 1 per cent. This, too, in a country notoriously insanitary. Compare this with the fearful losses of the British from preventable diseases in South Africa, or, worse, with our own losses in the Spanish-American war — where, in a campaign the actual hostilities of which lasted six weeks, the mortality from bullets and wounds was 268, while that from disease reached the appalling number of 3,862, or about 14 to 1, or 70 per cent—1 per cent against 70 per cent.

Naturally one asks, Were these results anticipated? As an answer, the statement of a distinguished Japanese officer, when discussing with me the subject of Russia's overwhelming numbers, is pertinent. "Yes," he said, "we are prepared for that. Russia may be able to place 2,000,000 men in the field. We can furnish 500,000. You know in every war four men die of disease for every one who falls from bullets. That will be the position of Russia in this war. We propose to eliminate disease as a factor. Every man who dies in our army must fall on the field of battle. In this way we shall neutralize the superiority of Russian numbers and stand on a comparatively equal footing.''

Japan is the first country in the world to recognize that the greatest enemy in war is not the army of the invader, but of a foe more treacherous and dangerous—preventable disease, found lurking in every camp.

If wars are inevitable and the slaughter of men must go on—and I believe wars are inevitable and that most of them are ultimately beneficial—then, for the love of God, let our men be killed legitimately, on the field, fighting for the stake at issue—not drop them by the wayside by preventable disease, as we did in the Spanish-American war—1,400 for every 100 that died in action. It is for the 1,400 poor devils who are sacrificed—never for the 100 who fall gallantly fighting—that I offer my prayer.

The state deprives the soldier of his liberty, prescribes his exercises, equipment, dress, diet, the locality in which he shall reside, and in the hour of danger expects him, if necessary, to lay down his life in its defense and honor. It should therefore give him the best sanitation and the best medical supervision that the science of the age—be it Japanese or Patagonian—can devise.

HELPING THE FARMERS

In the January number of this Magazine considerable mention was made of the work of the Department of Agriculture during 1904. The following paragraphs give information on certain lines of work which were not then described for lack of space.

RECLAMATION OF ALKALI LANDS

THE Secretary of Agriculture reports much progress made during 1904 on the alkali reclamation tracts established during the year previous, and indications point to the complete reclamation of the lands under experimentation at an early day. At the inception of the work on a 40-acre tract near Salt Lake City, a soil survey showed the first 4 feet of soil to contain more than 6,650 tons of soluble salts. In May, 1903, eight months after, there had been removed by drainage nearly 50 per cent of this immense total, and in the following October only 1,221 tons remained in the entire tract. The progress of similar work on a 20-acre tract at Fresno, Cal., has been no less gratifying. The Secretary declares his full confidence in the final success of this work and a firm belief that it will lead to individual or concerted action on the part of those most interested, with the result of greatly benefiting both the agricultural and stock-raising interests.

GROWTH OF CUBAN SEED TOBACCO

In the line of tobacco investigations which are carried on by the Bureau of Soils the most important work during the year was the experimental growing of Cuban seed tobacco on certain soils in Texas, Alabama, and South Carolina. Samples of tobaccos grown in 1903 were submitted to the trade, and the Texas leaf was found to have considerable merit both in regard to flavor and aroma. Some have pronounced it to be superior to any filler yet grown in this country. The Alabama filler leaf is considered fair. Final judgment of the success of this venture, however, must await further advices from dealers and manufacturers. Growing of the

Cuban type of filler has also been tried in Ohio. The most important work in Ohio, however, has been the further introduction of the bulk method of fermenting cigar tobaccos. Over 655,000 pounds were fermented in 1902, over 4,000,000 in 1903, while in 1904 the quantity so fermented exceeded 10,000,000 pounds. Considerable demand has been made the past year upon the Bureau to assist the growers of the heavy export types. Experiments have been undertaken to grow the tobacco with different fertilizers and under different methods of culture to see which will give the best financial results. It is yet too early to give the results of the present season's work.

SHADE-GROWN TOBACCO

In 1903 the Department of Agriculture had practically ceased its work in Connecticut in the production of shade-grown tobacco, but in 1904 it conducted an experiment at Tariffville, Conn., where a crop has been produced on a 4-acre plat. Tobacco of this type was exhibited at the Louisiana Purchase Exposition and received a grand prize as a leaf of the highest excellence for cigar wrappers. The Secretary presents a table which shows that 134 bales of Connecticut shade-grown tobacco have been sold for domestic use at an average price of $1.26 plus, the highest price obtained being $1.75 per pound for light wrappers. One hundred and forty-four bales were sold for export at an average of $0.34.

EXPERIMENTAL WORK IN COMBATING THE COTTON BOLL WEEVIL

The most important work of the Bureau of Entomology during the year has been its combat with the Mexican cotton boll weevil. Under the provisions of the special appropriation of $250,000, made available January, 1904, this work was greatly enlarged. Over a thousand acres, divided among thirteen experimental farms, were devoted to experimental work, and it is believed that the cultural system these farms were designed to illustrate has so far proved to be the only practicable means of controlling the weevil. This is the outgrowth of several years of experimentation.

COLONIZATION OF THE GUATEMALAN ANT

The discovery of the Guatemalan ant and its colonization in Texas is a feature of distinct encouragement. The eminent danger of the spread of the weevil, however, to other States indicates the necessity of continued active and energetic work on the part of the general government.

MEANS OF COMBATING THE BOLLWORM

Field experiments have demonstrated that the cultural system of control recommended for the boll weevil furnishes the very best means also against the bollworm. Spraying and dusting with arsenical potions and the value of truck crops have been made the subject of careful experiments, and the department is now able to recommend measures which will greatly reduce damage from this pest.

BENEFICIAL INSECTS

The possibility of keeping injurious insects in check by the introduction of their natural insect enemies is a popular subject with fruit growers and farmers, and notable success has been achieved in this direction.

STUDY OF INSECTS DAMAGING FORESTS

The general information gained from the study of insects damaging forests, carried on both in the field and in the laboratory, has greatly advanced the knowledge of forest insects and the means of controlling them. An expert has been placed in charge of investigations of insecticides, and fumigation experiments with fruit stock and buildings and granaries are now under way, as well as coöperative work between the Bureaus of Entomology and Chemistry on the composition of insecticides.

BIOLOGICAL SURVEY

The work of the Biological Survey has been continued along three principal lines : First, investigations relating to the geographical distribution of animals and plants, including biological surveys and the determination of the life and crop belts ; second, investigations of the economic relations of birds to agriculture ; third, supervision of matters relating to game preservation and protection and the importation of foreign birds and animals. In carrying out this threefold mission the Biological Survey is divided into three sections—that of geographical distribution, that of economic ornithology, and finally one of game protection and introduction.

IMPORTATION OF BIRDS AND MAMMALS

Constant vigilance is necessary to prevent the introduction into the United States of birds or animals likely to become pests. The permits issued during the year numbered 318, and included 1,470 mammals and 250,000 birds.

ENFORCEMENT OF GAME LAWS

Six convictions for illegal traffic in game were secured during the year under the Lacey act, making 42 convictions secured in cases passing through this department. In Alaska the game law has accomplished two main objects—the shipment of deer heads has been stopped, and the export of heads of big game as trophies has been curtailed.

PUBLIC ROAD INQUIRIES

Object-lesson roads have been constructed with the coöperation of the office of public road inquiries in Arkansas, Ohio, Tennessee, Virginia, and West Virginia. These were mostly first-class macadam roads. It has also coöperated at several points in the South in constructing experimental roads of a mixture of sand and clay. In the absence of stone and gravel, this mixture may be used to great advantage. Much has been accomplished during the year in the development of good roads by the state-aid plan. The main features of this plan as now adopted in several states are a state highway commission, appropriations from the state treasury to pay a portion of the expense, the balance being divided between the counties, towns, and the owners of property along the improved roads. Since 1890 eleven states in all have provided, in a greater or less degree, the state aid.

Much time has been spent in studying the physical properties of clays in an endeavor to devise methods by which they can be utilized in road making. Of 228 samples of road materials reported during the past year, 35 were clays. Clinkered clay has been successfully used for some time past as a railroad ballast. Experiments were made with samples of the so-called gumbo clay from the Yazoo district of Mississippi, and following these experiments the Office of Public Road Inquiries built an experimental road in Yazoo City, which has been reported successful. The Division of Tests has not confined itself to investigations of clays in their use as road material, but to their useful properties for any purpose, with a view to developing the use of native clays, of which the production already exceeds $2,000,000 annually, while of foreign clays over $1,000,000 worth are imported.

OILS AND ASPHALTUM FOR ROADS

The suggestion of the Division of Tests to road builders throughout the country to make experiments with mixtures of crude oils and crude asphaltum in road building has resulted in some cases very satisfactorily.

A SCHOOL FOR ROAD BUILDING RECOMMENDED

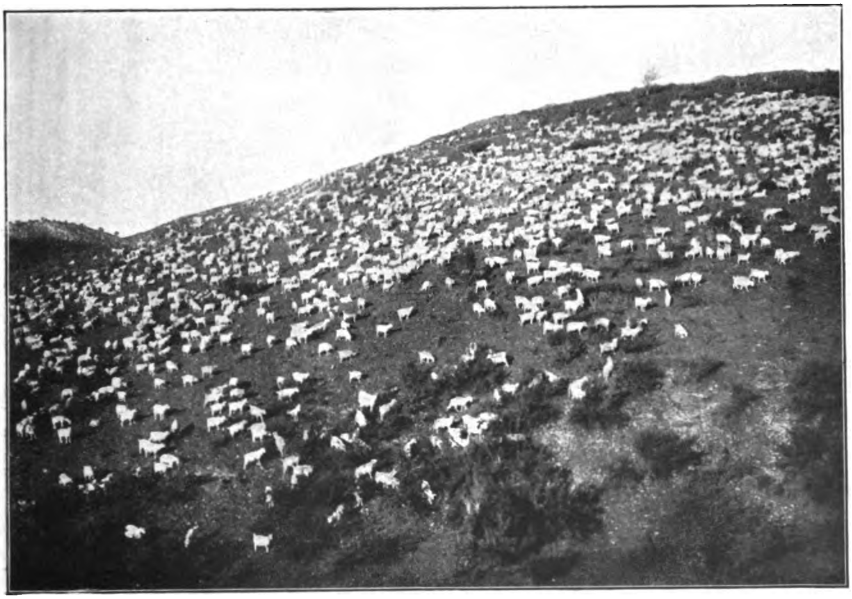
In connection with the subject of road materials the Secretary of Agriculture urges the desirability of a school for road building in connection with the department, the students to consist of men who have already received degrees from reputable engineering schools.

EXPERIMENTAL WORK IN ALASKA

Many interesting experiments have been carried on in Alaska. Distribution was made, moreover, of vegetable and flower seeds to some 1,500 persons, many of whom report success, and confirm the possibility of raising hardy vegetables in nearly all parts of the territory south of the Arctic Circle. In general, the experimental work in Alaska has shown that live stock could be successfully maintained at many points. Sheep raising has not proved successful, and the Secretary expresses the opinion that Alaskan grass lands as a whole can be most profitably used at present through dairying. The Secretary says it is doubtful if equally good opportunities for dairymen can be found in the United States today.

PUBLICATION WORK

The publication work of the department is a faithful reflex of its activity and growth. The number of publications issued during the past year aggregated 972, of which 379, comprising 23,000 pages of matter, were new. The number of copies of all publications printed during the year amounted to nearly 12,500,000. Of farmers' bulletins, of which 6,500,000 copies were issued during the year, nearly 5,000,000 were distributed upon the orders of members of Congress. Educational institutions are becoming more frequent applicants for publications, mainly for class work, and the Secretary suggests a plan by which, with the approval of Congress, unused congressional quotas of the department's publications might be made available.



From David Griffiths, U. S. Department of Agriculture

A Flock of Goats on the Ranges of Arizona

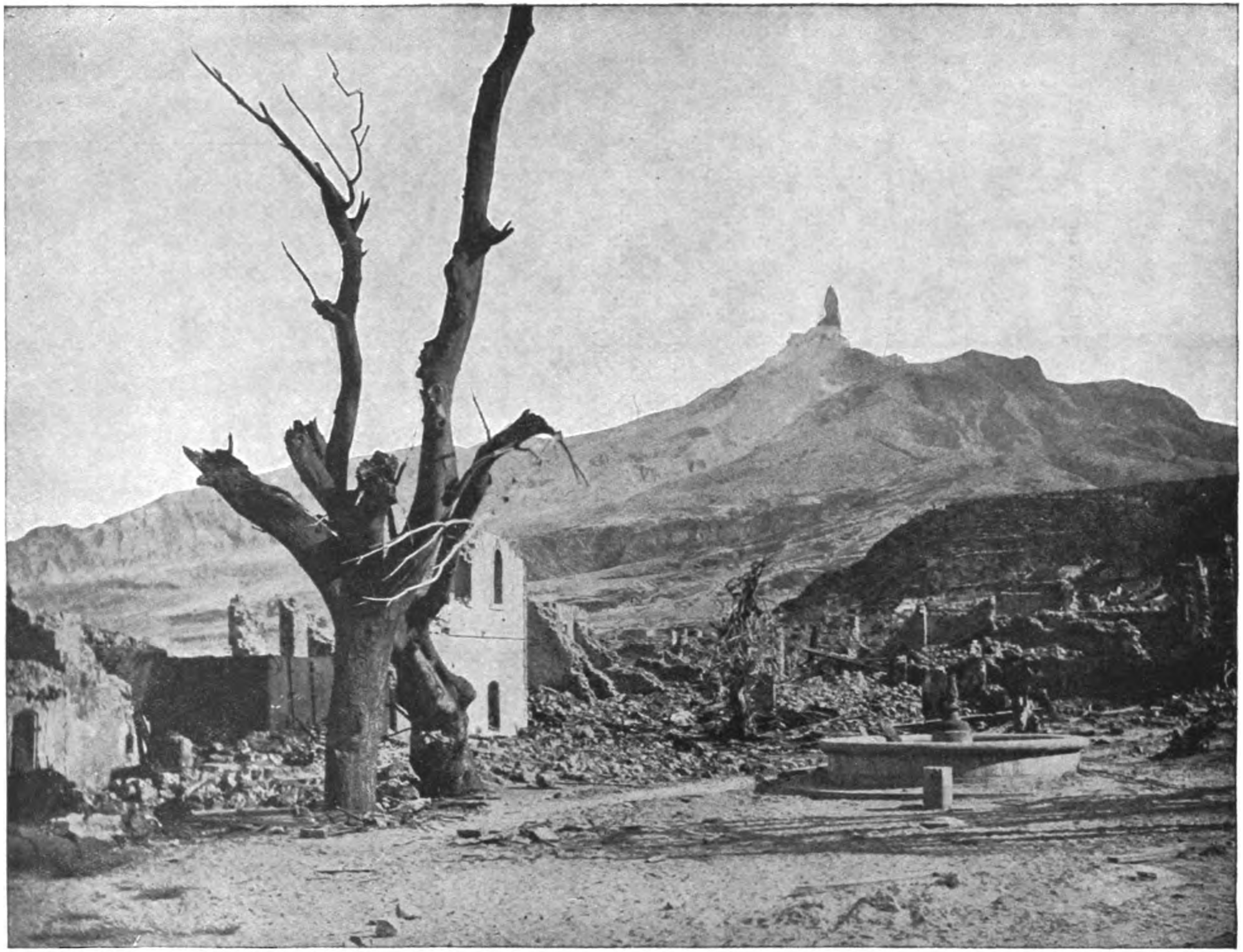


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Photo by Angelo Heilprin

Pelée, with Its Terminal Tower or Obelisk

As seen from the southern section of St Pierre (looking north-northeast, and across an interval of about five miles). Height of obelisk about 850 feet. Total height of the mountain, including obelisk, somewhat over 5,000 feet. From "The Tower of Pelée." By Angelo Heilprin. J. B. Lippincott Co. (see page 89).

GEOGRAPHIC NOTES

NATIONAL GEOGRAPHIC SOCIETY

THE annual meeting of the National Geographic Society was held at Washington, January 13. Eight members of the Board of Managers were elected to serve for the three years, 1905–1907, as follows:

Alexander Graham Bell, Alfred H. Brooks, Henry Gannett, General A. W. Greely, Gilbert H. Grosvenor, Angelo Heilprin, O. H. Tittmann, and General John M. Wilson.

Prof. T. C. Chamberlin, of the University of Chicago, was elected to fill the vacancy in the Board caused by the resignation of Prof. Wm. M. Davis, of Harvard University.

The report of the Secretary, Hon. O. P. Austin, showed that the present membership of the Society is 3,400, of whom 1.125 are residents of Washington and 2,275 distributed throughout the United States, Alaska, Philippines, Europe, Asia, and Africa. The net gain in membership for 1904 was 789. During 1904 the Society held 12 scientific meetings, 16 special meetings, and 4 field meetings.

At a meeting of the Board of Managers January 27 Dr Willis L. Moore, Chief of the U. S. Weather Bureau, was elected President of the Society. Dr Moore has been actively identified with the Society for many years, serving on the Board of Managers since 1899. At the same meeting Mr Henry Gannett, Geographer of the U. S. Geological Survey, was elected Vice-President. Mr Gannett was one of the incorporators of the Society, in 1888, and with the exception of the year 1903, which he passed in the Philippines, he has served continuously on the Board since the Society was founded.

CHART OF THE WORLD

THROUGH the courtesy of the Hydrographic Office of the Navy Department, and more particularly of Captain H. M. Hodges, hydrographer, and Mr George W. Littlehales, the NATIONAL GEOGRAPHIC MAGAZINE publishes as a supplement to this number a chart of the world on Mercator's projection, showing the submarine cable lines and their connections and ocean routes. Cable and telegraph lines are printed in red and ocean routes in blue. The latest cable lines are shown—as, for instance, the Alaskan cables of the U. S. Signal Corps and the wireless connection across Norton Sound. The tables of distances printed on the bottom of the chart will doubtless be found very convenient by many. One table tells at a glance the comparative distances of New York and Shanghai, or Yokohama by the Panama, Suez, and Cape of Good Hope routes. Another table gives the distances of our Gulf ports from the Atlantic end of the Panama Canal (Colon), and also from each other. The chart can be easily detached from the Magazine and hung on the wall for more convenient use.

NOTES ON THE PHILIPPINES

ONE of the most striking facts in the report for 1904 of Col. Clarence R. Edwards, U. S. Army, Chief of the Bureau of Insular Affairs, is the statement that only $5.300,000, or less than 8 per cent, of the $69,000,000 worth of goods entering and leaving the Philippine Islands in 1904 were carried in American bottoms. What a lamentable instance of the insignificance of our merchant marine, which, like our iron, coal, and agricultural industries, ought to be the greatest in the world.

During the year nearly 13,000 Americans went to the Philippines with the intention of making their permanent home there. Most of them did not specify the nature of their occupation, but among those who did were 333 teachers, 117 engineers, 50 physicians, 47 clergymen, 33 lawyers, 406 clerks and accountants, 186 merchant dealers and grocers, 58 mariners, and 18 miners. Many of these had received civil-service appointments from the United States. The administrative acts of the Bureau during 1904 were previously described by Colonel Edwards in the NATIONAL GEOGRAPHIC MAGAZINE of June and July.

"The question of labor in the Philippines has ceased to be a critical one, says the Collector of Customs for the Philippine Islands in his report for 1904. Despite the gloomy predictions of many thoroughly sincere investigators and writers on the subject, the Filipino laborer has conclusively demonstrated that he is a practicable and dependable element in the industrial development of the Islands. In the past two years several immense enterprises have been successfully carried on solely with the aid of Filipino laborers. All goods arriving at or leaving the port of Manila are handled by natives. During the past year the operation of the customs 'Arrastre plant' has been entirely in the hands of native labor, including the steam tramway and four large steam cranes.

"The Filipinos make good clerks, copyists, typewriters, sub-inspectors, and, in some instances, excellent fiduciary officers. In the handling of cash, in subordinate positions, they have shown a high degree of accuracy and integrity. As marine officers and engineers, especially in the latter position, they have exhibited a skill, fidelity, and courage which entitle them to unstinted admiration."

TRANSPORTATION IN ENGLAND

AT the present time, when there is so much comment on transportation rates in the United States, the following statements from an American consul in England of conditions in that country may surprise some of us:*

"The carriage for a ton of apples from Folkstone, on the south coast of England, to London, is $5.86, while goods of the same class are carried from California to London for $3.81. It costs $9.73 to send a ton of British meat from Liverpool to London, while it costs only $6.09 to send a ton of foreign meat to the same market. The Irish farmer who wants to get his produce to London has to pay $22.88 carriage per ton on his eggs from Galway, while the Danish farmer can send eggs into the London market for $5.85, the Russian for $5.10, and the farmer in Normandy for $4.05. The man down in Kent, who is almost at the London market, has to pay $6.10 per ton to the railway companies for carrying the produce of his orchard to London, while the same class of freight is brought from Holland for half the money."

TO OBSERVE SOLAR ECLIPSE

REAR Admiral C. M. Chester, superintendent of the Naval Observatory, has submitted a recommendation for provision for a naval expedition in 1905 to observe a total solar eclipse. He proposes to select an observation station among the high hills bordering on the Mediterranean, to work with some ship as a base near Valencia, and another station in the uplands, with headquarters on board a vessel on the northeast coast of Spain.

Ranges of Arizona.—David Griffiths is the author of a recent bulletin published by the Department of Agriculture, describing the ranges of Arizona and the measures necessary for their protection. The ranges can carry without injury one horse or cow to 50 or 100 acres. The range-owners have lately begun goat-raising with considerable profit. The picture on page 85 shows a flock of goats on one of these ranges. Excessive stocking has been destroying the value of the ranges.

*W. P. Smith, U. S. consul. Tunstall, England, Consular Reports, January 25, 1905.

GEOGRAPHIC LITERATURE

The Tower of Pelee. By Angelo Heilprin. With 23 full-page plates. Pp. 62. 9½ by 12½ inches. Philadelphia: J. B. Lippincott Co. 1904. $3.00 *net.*

This exceedingly handsome volume is a supplement to "Mont Pelée and the Tragedy of Martinique," published by Professor Heilprin in 1902. In it the author discusses the peculiar spine or obelisk which was thrust up the throat of Mont Pelée in 1903, rising to a height at times of nearly 850 feet, and which has since entirely disappeared. The series of views of this obelisk taken by Mr Heilprin and published in the volume are remarkably fine. One of them is republished in this Magazine on page 86. Mr Heilprin also publishes several pictures of glass water bottles and wine glasses which show marked deformations of substance without breakage. "There are no indications of glass flow, and the only apparent change that the glass has undergone is an acquired murkiness. The substance had evidently yielded to pressure impacts at a time when it was subjected to and softened by great heat. This condition sufficiently explains the similar condition of objects found at Pompeii, and does away with the necessity of assuming that the deformation was the result of a slow and steadily progressing molecular change whose workings extended through centuries (!)" Mr Heilprin believes that Pompeii was destroyed in very much the same manner as St Pierre and not, as has been generally assumed, by "simple incineration."

A Naturalist in the Guianas. By Eugène André, F. R. G. S., F. Z. S., M. S. A. With 34 illustrations and a map. Preface by Dr J. Scott Keltie. New York: Charles Scribner's Sons. 1904.

This is a real book by a naturalist and explorer of the old type, and from preface to conclusion is full of vivid and sharply drawn pictures. To any one who loves the solitude of the forest or who has felt the charm of the tropical jungle the book must appeal in the same way that Belt's "Naturalist in Nicaragua" or Bates' "Travels on the Amazon" have for many years fired the imagination of the youth of America and England; but to the writer the book has an additional reality and an indescribable fascination, for it describes the travels and ghastly hardships of a friend.

In 1899, while traveling with Mr Barbour Lathrop, of Chicago, I met the author in the Port of Spain, and I shall never forget the enthusiasm with which Mr Lathrop announced the discovery of this unusual naturalist. We traveled with him later from La Guayra to Panama, and the last time I saw him he was running home a charge in his muzzle-loader after a shot at some gorgeous Colombian song bird.

To the public at large South America is a puzzle. It reads of the great industrial and railway development of the Argentine, of the immense waterway of the Amazon, of the beauties of Rio de Janeiro, and of the ancient Inca civilization of Peru, but there is a silence in the popular literature regarding the immense center of the continent, to which these civilizations of the Argentine, Chili, Peru, and Venezuela form the merest fringe. Eugène André has pushed his way along the watercourses and through the jungles of this greatest of all unexplored tropical regions of the world, and this book which he has written gives a picture of the extreme discomforts, the real hardships, and the frightful exposure to disease and starvation which attends the work of exploration in the uninhabited tropical forest. To a boy familiar with the popular literature on tropical forests nothing could be more delightful than to make one's way, with hunting outfit and canoes, from Rio to Panama, living on the game and the fruits of the forest. André's account of his explorations dispels any illusions of the luxury of travel in tropical forests and makes the hardships undergone by Wallace in the Aru Islands or by Schweinfurt among the Naim Naim people of Central Africa seem insignificant.

The book describes two expeditions, in 1897–1898 and 1900–1901, from Trinidad up the Orinoco toward the headwaters of the Caura, with side trips up the Nichare and cross-country expeditions cut through the forest to Mounts Turagua and Améha, two of those remarkable mesa-like mountains which are characteristic of southern Venezuela. It is a narrative of daily experiences and observations and sparkles with that humor which is a necessary quality of a good explorer. The observations on animals and plants are unusually vivid and interesting and written with care, yet nowhere prosaic. His ability to take the reader into his confidence and to picture the trials of a naturalist in the tropics may be illustrated by the following:

"If the hornets pay attention to the person of the collector the ants devote themselves to looking after his collections, so that what with having to dodge a being with wings and a sting who means business when he has made his mind up, and trying to devise ways for keeping his property out of the way of an insect that can find a grain of sugar in a stack of hay, the amateur naturalist acquires his first real knowledge of the powers of those so-called lower forms of life."

It were beyond the province of a review to enter in any detail, but as I run over the pages of my friend's book, to collect the materials for which has twice almost cost him his life, certain of his observations seem most worthy of attention. His observations on the healthfulness of Ciudad-Bolivar, situated on the edge of a swamp into which all the village refuse is dumped, those regarding the Indians' confirmative belief in the mosquito as a carrier of the malarial fevers, and the presence of malignant ulcers in certain localities, reminding one of the Bagdad boil, have a bearing upon recent medical researches. His descriptions of the parasol ants, *Oecodoma*, and the manufacture of their fungus gardens remind one of Belt's historic descriptions. His remarks regarding the power of insects to locate at a distance the objects of their desires and make straight for them is as interesting as anything Maeterlinck has written about the bee.

The ichthyologist will find valuable observations in the book on the strange cannibal fishes of the Caura, and laugh at the antics of the alligator disturbed by the explosion of a dynamite cartridge in its particular pool. The rubber experts will read with interest of the forests of a new rubber tree discovered on the Nichare, a branch of the Caura, and of the Indian method of tapping the rubber tree in this region. Those who know the cumarin perfume of the Tonka bean will be interested to learn that these forests furnish the world with the sweet-smelling bean, and that their collection is a lucrative business. The geologist will find enough of interest in André's descriptions of the formations of the rocky canyons and river bottoms of the Caura and mesa-like mountains to hold his attention. The ornithologist will find described and pictured in cromolithographs at least two rare gorgeous tropical birds and mention of the habits of many other new species, while those ladies who wear egrets without a thought of where they come from will get from these pages the scolding of an ornithologist for assisting in the extinction of the beautiful tropical birds from which at their death the graceful egrets are plucked. The exciting part of the book to the average reader, however, begins in chapter XVIII with a description of the wrecking in the rapids of the boat containing all the provisions, clothes, tools, and note books of the party. From this point on, the center of interest changes and fastens upon the hardships of this little band of almost naked men in their weary marches through the tropical jungle. Without shelter from the tropical rains, with no food but occasional game and wild fruits, with fever-racked and emaciated bodies, and with discontent and mutiny among them, they dragged their way, aided by the remaining small canoe, 200 miles through the forest toward the outskirts of civilization. Twenty-six days can seem a lifetime and proved to all but six of the party of fourteen their closing days.

But it would be a mistake if I were to give the idea that the book is a gloomy account of hardships. On the contrary, it is full of a sparkle of incident and vividness of description that makes it stand out from the commonplace of ordinary works of travel and worthy of a place on the same shelf of honor of a naturalist's library with Darwin's and Humboldt's travels, Wallace's "Malay Archipelago," and Belt's "Naturalist in Nicaragua."

DAVID FAIRCHILD,
Agricultural Explorer.

THE PHILIPPINE ISLANDS, 1493-1898

IT is strange that Messrs Arthur H. Clark Co., of Cleveland, Ohio, have not received better support for their magnificent series of volumes on the Philippine Islands. The history of the islands during the first three centuries after their discovery is buried in letters and manuscripts which were inaccessible until the Clark Co. began their publication under the editorship of Miss Blair and Mr Robertson. As to understand the Filipinos we must understand their complex past, the publication is patriotic as well as enterprising in plan. The publishers have issued the following statement:

"The support accorded our publication, 'The Philippine Islands, 1493-1898,' has been so inadequate that we are facing a serious financial loss upon it. We have issued the work faithfully from month to month, and expect to complete it and fulfill our obligation to those who have supported it, even at a loss to ourselves. Thus far less than 100 sets have been placed in this country, although a larger number have been placed in the important libraries of Europe, India, Australia, the Far East, and the Philippines. Of the sets in this country nearly all are in public institutions; the remainder are in large private collections, which are not likely to come into the market for many years, if ever.

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BOOKS RECEIVED

Along the Nile with General Grant. By Elbert E. Farman. Pp. 339. 8½ x 5½ inches. New York: The Grafton Press. 1904.

Out of the Northland. By Emilie Kip Baker. Pp. 165. 5¾ x 4¼ inches. New York: The Macmillan Company. 1904. 25 cents.

Select List of Books Relating to the Far East. Compiled under the direction of Appleton Prentiss Clark Griffin.

Pp. 73. 10¾ x 7½ inches. Washington: Government Printing Office. 1904.

Excursions and Lessons in Home Geography. By Charles A. McMurry. Pp. 152. 7½ x 5¼ inches. New York: The Macmillan Company. 1904.

Students' Laboratory of Physical Geography. By Albert Perry Brigham. Pp. 153. 7¾ x 5½ inches. New York: D. Appleton & Co. 1905.

The Land of Riddles—Russia of Today. By Hugo Ganz. Pp. 330. 8½ x 5½ inches. New York: Harper & Bros. 1904.

NATIONAL GEOGRAPHIC SOCIETY

THE address on the Philippines previously announced for February 3 has been postponed until after the adjournment of Congress, as it is believed that official demands will then permit the Secretary of War to address the Society on this Subject.

POPULAR MEETINGS

National Rifles' Armory, 920 G street, 8 p. m.

February 3.—"The Evolution of Russian Government." By Dr Edwin A. Grosvenor, Professor of International Law and Modern Government in Amherst College.

February 17.—"Manchuria and Korea." By Col. W. S. Schuyler, U. S. A. Illustrated.

March 10.—"The Panama Canal." Rear Admiral Colby M. Chester, U. S. N., Superintendent of the U. S. Naval Observatory. Illustrated.

March 24.—"The Commercial Prize of the Orient and its Relation to the Commerce of the United States." By Hon. O. P. Austin, Chief of the Bureau of Statistics. Illustrated.

March 31.—"From Lexington to Yorktown." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

April 14.—"Fighting the Boll Weevil." By Dr L. O. Howard, Chief of the Bureau of Entomology. Illustrated.

April 28.—"Niagara Falls." By Dr G. K. Gilbert, Vice-President National Geographic Society. Illustrated.

SCIENTIFIC MEETINGS

Hubbard Memorial Hall, 8 p. m.

February 10.—General subject, "Progress in Animal Husbandry." There will be papers by Mr George M. Rommel, Mr G. Fayette Thompson, and others of the Department of Agriculture, on the work and plans of the Department for producing distinctive American breeds of Horses, on the Angora Goat, the Fat Tailed Sheep, the Barbadoes Woolless Sheep, on the introduction of the Bos indicus, etc.

February 24.—General subject, "The Botanical Investigations of the Department of Agriculture." By Mr F. V. Coville, Botanist, and members of his staff.

March 3.—General subject, "Progress in Plant Physiology." Papers by Dr George T. Moore and others on "Inoculating the Ground," "Protecting Municipal Water Supply Systems," etc.

March 17.—General subject,
"Japan."

The Geography of Japan. By Mr Eki Hioki, First Secretary of the Japanese Legation.

The Fisheries of Japan. By Dr Hugh M. Smith.

Agriculture in Japan. By Mr David G. Fairchild.

April 7.—General subject,
"Forestry."

Papers by Mr Gifford Pinchot, Mr Overton Price, and others, of the U. S. Bureau of Forestry, and a paper on Japanese Bamboos, by Mr David G. Fairchild.

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE CHARACTERISTICS OF THE JAPANESE PEOPLE*

By Baron Kentaro Kaneko, of the House of Peers of Japan

I CONSIDER it the greatest honor ever conferred upon me to speak before you here at the National Capital of the greatest Republic. As your President has announced, I have been out of practice in speaking the English language for nearly twenty-five years, and when I was asked by the Society to make an address I declined, because to speak in a foreign tongue after being out of practice so many years is a difficult task, and besides I can hardly convey my ideas and make you understand what I have in my mind. But the request was so sincere and so earnest that I felt that if I still declined I might offend the Society, so I accepted at last with hesitation, but with the greatest pleasure.

The subject of Japan is being written and talked about a great deal at this moment; therefore the subject I have selected for tonight is rather a different one, and might be called "The Characteristics of the Japanese People."

You have no doubt heard and read much about Japan, and my country is already familiar to you, but we have so far been misrepresented in many ways, even in the circle of scholars and learned communities. We have been often called a race of imitators or a race of copyists. To be sure, we have copied many things entirely foreign to our own institutions, but in so doing we follow always a certain principle. This misrepresentation arises from the fact that a foreign observer fails to distinguish between the outward appearance of human activity and the inner workings of man's mind.

Many travelers come to our country; they pass through from one end of the Empire to another; they go through the streets and squares; they see the people and buildings, and when they come home they say "the Japanese are copyists and they are a race of imitators," because they only see the outward appearance of our activity, but, unfortunately, never study the inner workings of our minds; therefore I have selected tonight this subject to present before you—the inner workings of the Japanese mind. The subject is rather gigantic—you might think too gigantic—but I will try to explain as clearly as I can.

---

* An address to the National Geographic Society, January 6, 1905.

"ADOPT, ADAPT, ADEPT"

The Japanese have a peculiar character. When they come in contact with a foreign civilization they always go through three stages of evolution: First, they pass through the stage of imitation. At this period they imitate everything that comes from a foreign source, and I might say that they blindly copy. But after some years of imitation they arrive at the stage of adaptation; then at last they reach the stage of origination. These three stages are clearly shown by our history, if we only examine into the inner workings of Japanese mind.

THE INTRODUCTION OF THE CHINESE CIVILIZATION

About 1,500 years ago, when we introduced the Chinese civilization into our country, we copied everything after Chinese fashion. At that time we had no national alphabet. There were some sorts of signs to express ideas in writing, and even these signs differed in different parts of the country. The Chinese had a highly developed type of hieroglyphics to express their ideas; therefore at one time the Chinese hieroglyphics took such a hold on the mind of the Japanese that we adopted them as our national language. The imperial edicts were written in Chinese hieroglyphics and government records were kept in that language; even Chinese scholars were employed in the government service as clerks and secretaries, and the Japanese language was almost on the verge of destruction and ruin.

This same phenomenon was found even in England when she introduced the Norman-French civilization. The Norman-French language was taught in schools and was spoken at the palace, as well as in the upper circles. The legal briefs in the courts were prepared in the Norman-French, and the judgments of the court were given in that language. Take, as an example, meat. When an animal is found in the field it is called an ox; but when it is prepared and served on a nobleman's table it is called beef, which comes from "beuf" of the Norman-French. So, again, when prepared on the table it is called mutton—"mouton," from the Norman-French; but when found in the field it is called a sheep. In Japan we went on exactly in the same way as the English people. Among the upper classes, as well as at the court, we used entirely the Chinese hieroglyphics. Every document of the government was kept in Chinese hieroglyphics, and the Japanese language was only spoken among peasants and in a remote part of the country, where the Chinese civilization did not reach.

Therefore this period might be called the era of imitation. Did our country remain long at that stage? Fortunately there came a scholar—the most famous scholar we ever had—by the name of Mabie, who returned from China in 735 A. D. He was in China many years for his education at Chinese schools. When he came back he saw what was most needed in his native country, and he invented out of the Chinese hieroglyphics the forty-seven characters of our alphabet, founded upon the principle of phonetic language. As you know, the Japanese language is phonetic, whereas the Chinese is hieroglyphic. This alphabet is called Shin Kana, which means a genuine alphabet, in order to distinguish from another and later invention of alphabet called Kata Kana. This period might be considered as the dawn of our era of adaptation, for we did not remain long in the stage of imitation, but soon began to realize the future of our civilization, and became conscious of the necessity of our national linguistic independence. Therefore the invention of the alphabet of 47 letters is always considered to have given birth to the Japanese literature, and is reckoned as the beginning of Japanese civilization.

After passing through the stage of adaptation, we soon entered into the stage of origination. In the year 757 A. D. a collection of old Japanese poems was compiled in the newly invented phonetic language. Again, in 798 A. D. the history of Japan was for the first time written in the new language—not in Chinese hieroglyphics as formerly.

THE PART PLAYED BY WOMEN IN JAPANESE LITERATURE

In the early part of the eleventh century "The Tale of Prince Gengie" was compiled by Murasaki Shikibu, a lady-in-waiting to the Empress, and about the same time another book, "The Scrap book Under the Pillow," was written by another lady-in-waiting by the name of Seisho Nagon. This lady, while on duty, observed everything going on in the political as well as social circle of the imperial court, and at night when she retired she used to write whatever she saw during the day in a scrap-book which she kept under her pillow. This custom she kept up during her life-time, and afterward the scrap-books were compiled and published in book form. These two books, "The Tale of Prince Gengie" and "The Scrap-book Under the Pillow," are considered even now as our Japanese classics, and are studied in our colleges and universities as much as Chaucer's "Canterbury Tales" and Spencer's "Fairy Queen" in your colleges. So you see that our women took a first rank in Japanese literature, and men (unfortunately for them) must be contented to occupy a second position, for men did not prove themselves capable of such a literary work, and those ladies fully mastered the new language and wrote in a most beautiful style, which had never yet been excelled by any man or woman. This period is called the era of origination in our literature.

Next we come to the subject of religion. We have passed through three stages in our religion just as much as in our literature.

Buddhism was first introduced into Japan through Korea in the year 552 A. D.—that is, 1,353 years ago. At first Buddhism was embraced by the higher classes, particulary among scholarly circles, but the lower classes or common people still clung to their old faith of Shintoism. Those who believed in Buddhism went so far as to copy the ceremonies and ritualisms. The doctrine of Buddhism was written in the Chinese language, and the believers offered their prayers in that tongue. At one time Buddhism made such a stride as to become almost a state religion, but the common people still opposed it, with a determination to uphold their own Shintoism. Consequently a most terrible struggle began between the two religions—Buddhism in the hands of the upper classes and Shintoism in the hearts of the common people. Such a contest as this blocked every step in Japan's progress, but finally the statesmen and priests began to understand that they no longer could force upon the people a blind imitation of Buddhism, and they changed their policy and tried to find out some means to meet the requirements of the time. Here again we reach the stage of adaptation.

THE GREAT DAIBUTSU

They invented an ingenious theory of explaining and interpreting the religious principle of Buddhism. They adapted the theory of Monotheism as well as Polytheism by saying that there is only one Supreme Power, which is personified in the form of various gods and goddesses, according to the different countries and different institutions. Thus they reconcile the principle of the one Supreme Power in Buddhism with the Polytheistic theory of Shintoism.

In order to convince the popular mind with this theory, Emperor Shomu patronized a movement to erect a large bronze statue of Daibutsu or Buddha at Nara, and this statue was erected in 752 A. D., after fourteen years in casting and construction. No doubt some of you who have visited Japan have seen the statue, but no foreigner has so far ever examined into its history and investigated why it was erected at the ancient capital of Nara. Thus Emperor Shomu succeeded in reconciling the two conflicting religions of Shintoism and Buddhism. This period might be called the era of adaptation of the Indian religion in Japan. Henceforth Buddhism swept from one end of the country to the other, converting a large number of people by the theory that "Shintoism is for the living and Buddhism for the dead," or, in other words, that while we are living on this earth the Shinto gods protect us, but when we die our soul returns to the last repose, where Buddha reigns.

THE MARTIN LUTHER OF JAPAN

In the beginning of the thirteenth century there was one priest by the name of Shinran, who is considered in our religious history as a Japanese Martin Luther. He revolutionized the fundamental principle of Buddhism by a new doctrine, for up to that time Buddhism strenuously upheld a monastic life, and the priests were compelled to live in celibacy and abstain from eating any animal food. But this famous priest, seeing the popular mind already turned toward Buddhism, started a new doctrine that a priest, being human, is just as much susceptible as laymen, and abstinence from human wants is against the laws of nature; moreover, a priest must live among the people so as to understand the real nature and feeling of man and woman; therefore a monastic life should be given up and priests should eat animal food and get married, if they desire so to do. From this period the progress of Buddhism with this new doctrine was wonderful and took complete hold of the popular mind. Even at the present time this Shinran sect of Buddhism has the largest number of believers in Japan. Thus the Japanese have gone through three stages—of imitation, of adaptation, and of origination—and in the last stage Shinran was the originator of the new form of Buddhism just as much as Martin Luther was of the Protestantism of the Christian religion of the West.

Next in the sphere of government and law we find the same three stages of evolution. After the introduction of Chinese civilization our governmental organization was moulded after the fashion of the governmental system of the Tō dynasty of China. In the year 701 A. D. we reorganized the departments of our government in accordance with the principles and forms of the Chinese system, and adopted the Chinese law in every branch of our national affairs. At the palace the Emperor as well as the petty officials wore the Chinese headgear and gown. We blindly imitated everything Chinese. This new regime for the organization of the Japanese Empire was embodied in the laws of the Taiho era (701 A. D); but this wholesale change in the political institution was too much for Japan to carry out at that time. Therefore those laws were only executed around the capitol of Kioto and were not carried out in the remote parts of the country.

But the Hojo dynasty, the second military Shogunate of Japan's feudalism, discovered the weakness and defects in the laws of Taiho, because the laws of a foreign country could never be executed in toto, for the simple reason that every nation has traditional laws of its own which every law-giver must not disregard. Therefore Takatoki Hojo, a great statesman, investigated the old customs and traditions of Japan and modified the Chinese-imitation laws of the Taiho era so as to meet the requirements of the country.

This modification is found in a compilation of the customs and traditions of old Japan, which was promulgated in the fifty articles of Teiyei era (1232 A.D.). This is something like the Justinian Roman laws compiled in the reign of Emperor Justinian. This period we call the era of adaptation in our legal evolution.

THE JAPANESE JURY OF TWELVE JUDGES FOUNDED 670 YEARS AGO

No doubt an American audience will be much interested to know that as long ago as the year 1232 A. D. a Japanese statesman made the laws in touch with the popular feeling, for by the laws of the Teiyei era he established a council of state with twelve judges, the same number as the English jury. These twelve judges sat in the council chamber, before whom all litigation was brought for investigation and decision. The plaintiff and defendant had their spokesmen, who argued and defended the case; and afterward the twelve judges retired into a closed chamber, where an oath was administered to them as follows:

"During the deliberation of a case, and the decision afterward between right and wrong, neither family connections, nor sympathy with or antipathy against, the party shall influence. Fear not a powerful family, or favor not a friend, but speak in accordance with the dictates of truth. Should there be a case decided wrong and redress refused to a man, we shall be punished by all the gods and goddesses of the realm. Thus, we swear and affix our signatures."

This is the oath they take before they deliberate and examine the case. Here we have the law, whose spirit and principle are exactly the same as the Anglo-Saxon common law. Again, in 1336 A. D. the laws of the Kenbu era were promulgated by the Asikaga dynasty. This era, combined with that of the Hojo dynasty, might be called the stage of adaptation; but the era of origination begins later on with the Tokugawa dynasty, because the Shogunate of that family made for the first time the distinction of the laws between the sovereign *de jure* and sovereign *de facto* by promulgating "The Seventeen Articles for the Imperial Family" and "The Eighteen Articles for the Military Ruler," and then again they made the laws for the people, which were denominated as "The One Hundred Articles of the Tokugawa Regime." Thus the laws—imperial, military, and common—were executed throughout the whole country without an intermission until the imperial restoration in 1868. With this theory of the characteristics of the Japanese people in our minds, we will find the same three stages of evolution throughout the whole course of our national progress in arts, architecture, industry, commerce, etc.

THUS OUR TRAINING FOR CENTURIES HAD EQUIPPED US TO ASSIMILATE ANOTHER CIVILIZATION

Therefore, when we were confronted at the time of the imperial restoration, in 1868, with a new type of civilization, the western civilization, we were fully equipped by our individual strength and national power to assimilate the foreign civilization with our own, for we had gone through many hard and persevering struggles—religious, social, and political—for many centuries, and without fear could welcome the modern culture and science.

WE STRIVE TO MARK OUT A "GRAND POLICY FOR A CENTURY TO COME"

Here I might refer to one fact, that the Japanese are a little different from the western people in regard to their respect for the past, for they adore the past and the history of their ancestors much more than occidental people do.

As keenly and as profoundly as we look toward our future and our prosperity—the future of our family and our nation—we cling still more keenly and more delicately to our past—the tradition of our forefathers and our nation. We always look ahead in search for something higher than our present condition for our descendants. Our present welfare and happiness is nothing to us when compared with an illustrious past and a great future for our family and our nation.

Thus looking forward to our future, we constantly strive to mark out "the grand policy for a century to come." This is a rather high-sounding word, but when we examine our history we always find it underlying in our national movements—social, religious, and political—because the Japanese from time immemorial have shown their peculiar characteristic to mark out what they will do for the future. In order to establish this grand policy they always study the problem with a far-reaching foresight. This trend of mind is the characteristic of our race. When they contemplate a great problem for national affairs they never think of themselves, but always look forward through the labyrinths of the future to find out the surest way to attain their ultimate aim and goal. According to Japanese notion, compared to this grand policy for the future the present welfare and happiness of ourselves dwindles into nothingness. This policy was clearly and positively marked out by our Emperor on his ascension to the throne, in 1868. Upon that memorable day he swore before the nation in his "Five Articles of the Imperial Oaths": "Seek knowledge in the civilized world, and discriminate the good from the bad and adopt the best; and finally establish the national assembly where all the important affairs of nation shall be decided by public voice." This is the fundamental principle of our national aspiration, closely followed by the Emperor himself and down to the meanest peasant. In order to carry out this policy we must first bear in mind and maintain the past traditions of our country and then engraft upon them the western culture and science.

WHAT WE HAVE TAKEN FROM EUROPE AND AMERICA

With this view we began to reorganize our country in 1868. Since the imperial restoration we have studied the systems of government of the United States and European countries. As you have divided your government into different departments, we divided our government into similar departments. We adopted a compulsory system of national education, exactly on the same plan as your common-school system, of eight years of compulsory education. A boy and girl must attend school as soon as they attain the age of six, and remain there until the age of fourteen. The first four years we teach them the Japanese and Chinese languages, and the latter four years we add English; therefore when a boy and girl graduate from our common schools they can read and speak English. By teaching the Chinese and English languages besides our own we bring up a new generation prepared to seek knowledge in the outer world, as commanded by the Emperor.

In the organization of our army we copied the German system, and in our navy the English and American. In our code of laws we imitated La Code Napoleon, and afterward the German principle and method. In finance we copied your system by adopting your gold, silver, nickel, and copper money, and we went so far as to copy the greenbacks from you. Our first paper money was made and printed in New York in 1870, and if you will take up those old Japanese greenbacks you will find them exactly the same as yours, and no difference except in the writing.

When we come into contact with a foreign civilization we at first blindly imitate it, because that is, according to our idea, the shortest cut to our ultimate goal; but we are never satisfied to remain forever in the stage of imitation. This is clearly shown by our progress during the last thirty-seven years since the introduction of the western culture and science. Our recent evolution differs from the case of our forefathers in this respect, that our era of imitation after 1868 was very short, and the stage of adaptation began very soon after, and even the latter stage was simply a passing phenomenon before we reached the stage of origination. The proof of this fact was fully shown by our constitution. If you examine the constitution of Japan from the first article to the last you will find it quite different from those of American or European countries, yet its frame and foundation are in accordance with the principles of the western constitutions. Therefore I might say that the constitution of Japan is a living monument of the origination of Japanese statesmanship.

Again, in the realm of science, we have already reached the stage of origination by Dr Kitasato's discovery of a new bacteria. He discovered it in Germany and was decorated by the German government; and Dr Takamine, who is now living in New York, discovered adrenalin, a medicine which is used to stop bleeding, particularly by oculists in operations on the eye. Next comes Baron Ito, whose untiring investigation in botany made his name recognized by both American and European scientists.

Major Shimose's smokeless powder is a Japanese invention, and is acknowledged far more powerful than the English lyddite or the French melinite. This powder is by an actual test five times as strong as the European powders. When a shell that is filled with lyddite or melinite is fired it will break into ten or fifteen pieces, whereas the same shell filled with Shimose's smokeless powder when exploded bursts into 2,000 to 2,300 pieces. It is now considered the most powerful smokeless powder ever invented, and its inventor is a major in the Japanese army. Thus we have already entered into the era of origination.

In closing I may here sum up in a few words that although we dearly cling to the memory of the past, yet we eagerly hope for a great future, and in order to realize this hope we mark out the "grand policy of a century to come" with a far-reaching foresight. For means to carry out this policy we come to Europe and America. We go to Germany to study the German system of exactness, for they are noted for thoroughness in everything, but their system was found by our experience to be too stiff and inflexible. As exact and thorough as their system is, it is much more liable to leave us handicapped; therefore we come to America, for the Americans are the most practical people in the world. They cannot mark out such an exact system as the Germans, but they always use their common sense and come out successfully whenever they encounter a difficulty. They do not care so much for academic principles, but they have the tact to solve any question from a practical point of view; thus in Anglo-Saxon practicability we found our indispensable rescue.

OUR ASPIRATIONS

This "grand policy" for our national affairs, marked out "for a century to come" by our far-reaching foresight, coupled with German exactness and American practicability, will be the future course of the Japanese people. Then you will ask, What are your aims and aspirations? To this question I answer that our national ambition is by engrafting the western culture and science upon our own institutions to blend together and assimilate the two types of civilization—oriental and occidental—and by doing so to bring forth a new type of civilization, in which the culture and science of the two hemispheres will meet, not in conflict, but in harmony, so as to enable us to share the inheritance of Christian religion, oriental philosophy, Greek art, Roman law, and modern science.

Thus we hope in the course of the twentieth century to have at least one fruit out of our earnest and persevering efforts to contribute to the progress of mankind.

GEOGRAPHIC NAMES IN THE UNITED STATES AND THE STORIES THEY TELL

By R. H. Whitbeck, New Jersey State Normal School

THE geographical names of a country tell much of its history. Each race that inhabits a region gives its own names to mountains, rivers, and lakes, or adopts names previously given. A stronger people may, in later centuries, destroy or drive out every member of the earlier race. The latter may hand down no written sentence of its own history, yet some record of the race will be preserved in the geographical names which survive. The Romans were not able to vanquish the Britons. Comparatively little of Roman civilization penetrated the British Isles. The fact that the Roman "conquest" was little more than a *military* occupancy is attested by the geographic names which the Romans left, most of which terminate in -caster or -chester, from the Roman military word *castra*, a camp. Each wave of invasion—Roman, Angle, Danish, Saxon, or Norman—left its story in the names which it gave, and which remain like the stranded boulders of a glacier long since melted away.

The varied history through which different sections of the United States have passed is told in the varied nature of its geographic names. The red man built no cities in whose ruins we may read the story of his past, for the Indian was not a builder. He has left no roads or fortresses or castles; his methods of warfare called rather for a forest trail and an ambuscade, and these leave no ruins. Were a traveler to examine every valley and hill, every pass and ford and mountain from Maine to Florida, he would now find few traces of the red man in any material thing which survives him. But on every hand he would find the record of Indian occupancy in the names of rivers, creeks, and lakes in which the red man fished and on whose shores he camped and hunted and warred. The mountains seem to have had little attraction for the Indian, and it is seldom that a mountain bears an Indian name. The red man cared little for the bays and inlets along the coast; he made little use of the offshore islands; hence it is that among the hundreds of local names given to islands and bays along the coast of America one seldom meets an Indian word. But the streams and lakes were the Indian's delight. On their surfaces or along their banks most of his time was spent. Along their sides ran his trails and on their shores stood his villages. Every considerable stream and every lake had its name. When the pale face came he found the lake and the stream already named. When he traded with the dusky brothers for his furs or when he bargained for his land it was convenient to employ the geographical terms already in use by the Indian. Sometimes the white man gave the river or lake a new name, as did Hudson and De la Ware and Champlain, but oftener he accepted the original, and today the most frequent reminder that we have of the unfortunate race is the hundreds of Indian names, mostly of rivers or lakes, sometimes of cities, counties, and states, named after the tribes that dwelt in the vicinity.

The extent to which the early settlers adopted Indian names differs widely in different parts of the country. Twenty-four rivers of Maine, 17 out of 28 rivers of Connecticut, 40 rivers in Georgia, 32 in Florida, and most of those of Pennsylvania, New York, Ohio, and Indiana have Indian names. In Kentucky, Tennessee, and the large majority of trans-Mississippi States Indian words are much less common than they are east of the Appalachians. For example, only 7 of Tennessee's 30 important streams carry Indian names, and not one large stream wholly in Kentucky and not one in the great State of Montana has an Indian name.

Next after rivers lakes remind us most frequently by their names that the red man once dwelt by their waters. Hundreds of New England lakes, particularly of Maine, most of the important lakes of New York, and 4 out of the 5 Great Lakes tell of the Indian.

Even in those states where rivers and lakes most generally bear Indian names the political divisions, the mountains, and the shore features do not. Only 2 of the original 13 states, Massachusetts and Connecticut, and 3 of the mountain states, Arizona, Utah, and Wyoming, have Indian names, while 16 of the 18 Mississippi Valley states have such names. The two exceptions are Wisconsin and Louisiana, both of French origin.

Of the 150 cities in the United States with 25,000 or more people less than a dozen have names of Indian origin. In most cases where states, counties, or cities bear Indian names they have borrowed them from rivers or lakes which already bore them. New York has 20 counties with Indian names, and leads all of the states in this particular. Six out of the 16 counties of Maine have Indian names; but aside from Maine and New York Indian words form but a very small proportion of the county names in the United States. In the geographical names of Indian origin the differences in tribal dialects are everywhere striking. The horrible words of the Russian language do not differ more widely from the soft, mellow language of Italy or France than do the Indian names in northern New England from those of New York. Indian words in Connecticut differ radically in sound from those of New Jersey, and those of South Carolina, Georgia, and Florida differ equally from all others.

Contrast the unspeakable names of the lakes of Maine with the delightfully euphonious names of the lakes of New York:

Maine	*New York*
Chesuncook	Seneca
Pamedecook	Owasco
Motesentock	Otsego
Molechunkemunk	Onondaga
Moostocmaguntic	Cayuga
Mallawamkiag	Cayuta
Cauquomogomoc	Oneida

Again note the difference in sound of the words from different parts of Connecticut:

Mashapaug	Housatonic
Pistepaug	Mystic
Wangumbaug	Niantic
Waremaug	Scantic
Pomeraug	Willimantic
Quinebaug	Yantic

It is evident that the above words tell of very different dialects, and hence of different tribes. The characteristic terms found in New Jersey and in Virginia, for example, tell a similar bit of history :

New Jersey	*Virginia*
Musconetcong	Chickahominy
Hopatcong	Mallapony
Pohatcong	Potomac
Watchung	Rappahannock
Minnisink	Shenandoah
Navesink	Appomattox

When we pass into South Carolina, Georgia, and Florida, we find an entirely different set of sounds predominating in the geographical words:

Allapoha
Altamaha
Tallapoosa
Oostanaula
Soquee
Oconee
Ohoopee
Ochmulgee
Kissimmee
Chattahoochie
Auchee Hachee
Caloosahatchee
Chilloccohatchee
Choctawhatchee
Contoohatchee
Fahkahnatchee
Ulcofauhachee
Withlochoochee

While 17 streams in Florida have names ending in ee, only 3 in the nearby State of Mississippi have such names, suggesting that tribal boundaries were, on the whole, rather definite, and that tribal dialects dominated over well-defined areas. These geographical words show how widely the Indian dialects differed in their prevailing sounds. The ear of the Iroquois evidently delighted in vowel sounds, and most of the Iroquois geographical names terminate in a vowel, usually a or o. The tribes of New England show no such preference. In fact, their long words, loaded with consonants, seem like a train of half articulate grunts. The tribes of New Jersey, Pennsylvania, and Virginia had more musical ears and dialects. Most of the words which they have bequeathed us are pleasant to the ear and flow smoothly from the tongue. But when one examines the words by which the red men of the South Atlantic States called their lakes and rivers, he is led at once to suspect that a crew of shipwrecked Chinese must some time have been stranded on these shores and have tacked to the original names a liberal sprinkling of characteristic Chinese ee's. With the exception of the Great Lakes region, the Atlantic coastal states are the only ones which are fully strewn with Indian names. Other regions have them, but not in abundance.

There are other linguistic trails over our land besides those left by the red men. Up the Hudson and Mohawk goes the trail of the Dutchman, his footsteps marked by Fishkill, Catskill, Peekskill, and Shawangunk Kill ; by Rhinebeck and Rhinecliff ; by Stuyvesant, Rensselaer, and Amsterdam.

In northern New York and Vermont is the trail of the Frenchman who dotted his path with Richelieu, Ausable, St Albans, Vergennes, and other terms of Gallic sound. The so-called Pennsylvania Dutchman has spread himself thoroughly over the land of Pennsylvania, and still reminds us of his nationality by the several hundred burghs which he founded. The Swede has left a memorial of himself along the Delaware in Swedesburg, Swedeland, Swedes' Ford, and Swede Furnace.

The trail of the explorer-priest extends from the mouth of the St Lawrence to the mouth of the Mississippi and along the larger branches of both rivers. His mind was bent upon missionary enterprises and his calendar was filled with saints' days. Those who came after him—to hunt, to trap, to trade, or to settle—were like him—Frenchmen and Catholics—admirers of the saints, whose names they gave to the rivers which they discovered, the trading posts, and the forts which they established or the settlements which they made. Such are St Lawrence, St John, St Peter, St Hyacinthe, St Catherine, St Thomas, St Mary, St Paul, St Anthony, St Joseph, St Charles, St Louis, St Francis, and St Martin, all and many more scattered along the path of the French explorers from Newfoundland to Louisiana. Hundreds of other French words mark the pathway of La Salle, Father Hennepin, and their followers; Wisconsin, Eau Claire, Fond du Lac, La Crosse, Des Moines, Des Plaines, Vincennes, Prairie du Chien, Pierre, Versailles, Louisiana, Baton Rouge, and New Orleans.

The geographical names in the two neighboring States of Mississippi and Louisiana tell differences in the early history of the two states. Not a county, island, lake, river, or city in Mississippi has a "saint" in its name, while 9 counties (or parishes) in Louisiana and 40 towns, rivers, or lakes do homage to the saints in their names.

The French occupation of Louisiana obliterated most of the Indian words. The most conspicuous reminder of the French settlers is seen in the "bayous." This is the French word for small stream; one scarcely hears of a creek in Louisiana. They are all bayous. In Maryland they are "runs."

In Kentucky and Tennessee the vocabulary of the priest is strikingly absent; neither state has a county or stream named after a saint, but the vocabulary of the hunter and trapper is found everywhere; for example, in Tennessee we find the streams telling of the hunter in such names as Buffalo, Duck, Elk, Forked Deer, and Little Pigeon.

Montana and Idaho geography tells unmistakably of the invasion of the unschooled miner. He sought the mountains with their treasures of ore. Almost every peak and range of these states bears a name which reveals at once that it was given by men who thought or cared little for the names which history or literature might suggest. Such men would naturally select Bear's Paw, Big Horn, Snake Head, Saw Tooth, Bitter Root, and Seven Devils.

Indian names are seldom met with in these mountain states. In fact, if one scans a list of the geographical words in Montana, Idaho, Wyoming, and Colorado he will scarcely suspect that Indian tribes ever lived within their borders.

The early settlers of Nebraska, Kansas, Dakota, Wisconsin, and Iowa were of a very cosmopolitan character, of varied nationalities, creeds, and ideals. They came from the Eastern States and from foreign countries, and to their settlements gave names that tell of the places in the East, or across the sea, whence these pioneers came.

Though Texas was formerly a part of Mexico and was subjected to Spanish influences, yet one fact at least reveals how slight was the real hold of Mexico upon Texas—the relative infrequency of names with the prefix san or santa. Like the French in the St Lawrence and Mississippi Valleys, the Spaniards in the regions which they explored were inclined to leave a spattering of saints' names. Where Spanish influence really dominated there the san and santa is frequent, and there rivers are "rios" and mountains are "sierras." While such words are often found in Texas—as, for example, San Antonia, San Diego, and Rio Grande—yet these names are relatively infrequent, but naturally increasing as you approach the Mexican border.

The stronger hold of the Spanish upon California is seen in its 10 counties and 15 important streams with names beginning with san or santa. Nearly all of the large cities and over 150 towns of California tell of the Spanish settlement—San Francisco, Sacramento, Los Angeles, San Diego, Alameda, Santa Cruz, Santa Barbara, and many more. Indian names are seldom found.

In the early fifties two important events were taking place on opposite sides of the earth—in Europe the Crimean war, in America the rush for the gold fields of California. In 1854–'55 came the famous siege of Sebastopol in the Crimea. Half way around the world, in the land of new-found gold, men were founding towns and adopting names for places, and among the names which the California miners selected are seven "Sebastopols," another illustration of how geographical names record history.

In Arizona and Colorado the trail of the Spaniard is everywhere visible. Twenty larger streams of the latter state are "rios." In the former the Spanish mesa, butte, el, san, and santa are constantly met with, yet of the 14 important mountain passes in Arizona not one has a Spanish name.

The desert lands of Nevada did not tempt the cavalier or the priest to build forts and missions. There was little to attract them into its sandy wastes. Less than a half dozen of the 40 important mountains and peaks are named in the Spanish tongue, and not a county in the state has a Spanish name. The place names of Oregon and Washington tell the checkered history of those states. Capes Foulweather and Disappointment speak of unhappy voyages. Astoria recalls the fur trade that helped to found the Astor fortune. The neighboring towns of Harrisburg and Lebanon suggest colonies of people from southeastern Pennsylvania. Salem suggests Massachusetts, and Albany speaks of New York. In both Washington and Oregon Indian names are rare. In Oregon not a saint, san, or santa is attached to a county or important natural feature.

Thus does history unwittingly record itself. Thus is a key which admits us to a glimpse of past events found in the place names of any region.

A GROWING CAMP IN THE TANANA GOLD FIELDS, ALASKA*

BY SIDNEY PAIGE, OF THE U. S. GEOLOGICAL SURVEY

IT is impossible to know in how many and how widely separated localities the question, "Going to the Tanana?" was asked and the reply, "Yes," given during the past two years in Alaska. From Skagway, in the southeast, to Cape Prince of Wales, in the extreme west, from Dawson, on the Yukon, to St Michael, on the coast, the query has been rife, and the "ayes have seemed to have it" everywhere.

A glance at a map of Alaska will reveal the nearly central position of the lower Tanana Valley, just now the focus of interest for so many hopeful souls. A new camp is always an alluring "proposition," but one that stands the test of time becomes a veritable magnet to that great mass of shifting and roving fortune-hunters, the Western placer-miners. The Tanana fields have stood the test, and Fairbanks town, with all the strength of its new life and important position, means to rival Dawson, across the line.

Six miles to the south flows the Tanana River, second in size only to the Yukon, which it meets 150 miles to the west and with which it forms the great highway to and from the "diggins."

During the summers of 1903 and 1904 great numbers used this easy but long trail to Fairbanks.

The White Pass and Yukon Railroad, leaving Skagway on tide water, climbs the mountains of the coastal range, and, following the beautiful shores of Lake Lindeman and Lake Bennett, brings the traveler to Whitehorse, famous for its rapids, which in the olden days brought

* Published by permission of the Director of the U. S. Geological Survey.

Photo by Sidney Paige

On the Winter Trail to the Gold Fields

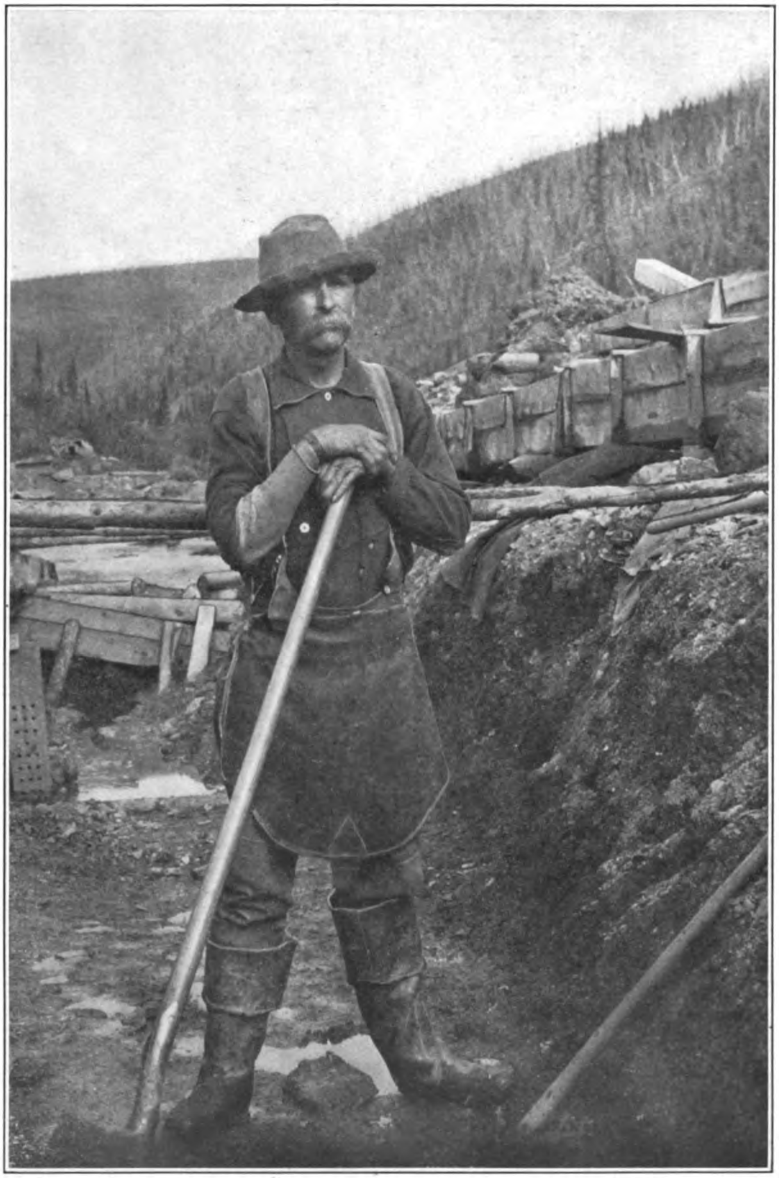


Photo by Sidney Paige

One of the First to Reach the Tanana Gold Fields to grief so many a hopeful tenderfoot. Down the river, through Lake Lebarge and the "Five Fingers," one can journey under many different class tickets. There is the first-class ticket on the first-class boat, which means that you may have a stateroom if you are lucky, or the floor under a table if you are not, and there is the second-class ticket on the first-class boat, which means you may sleep above the boiler if cold-blooded, or on the bow of the boat if warm; then follow the first and second class tickets on the second-class boats, which cost as much as if they were first-class, but always inspire the sentiment, "If I'd only stayed to home with mother." The wise and independent traveler eschews both classes and masses and takes to the open boat, in many ways the most attractive mode of traveling. The river flows swiftly; the days are endless and the scenery beautiful and varied; hills and valleys, cliffs and flats, fly by as one takes the midstream to escape "them pretty little ——," the mosquitoes, and 50 miles in a day's run before camp is pitched requires little effort. If in great haste to tread the streets of gold and collect the nuggets waiting, "watch and watch" will enable you to utilize the long Arctic days. At Gibbon you await the first steamer up the Tanana, for ascending by small boat means much hard poling and tracking on the bank, 15 miles being a big day's work. The light-draught steamer is crowded, and you are in luck if you find space for your blanket on a secluded spot of the deck. But all are gay and hopeful, and dreams of a farm in southern California, with an orange grove about the house, or a brown-stone front on Fifth avenue in the East put energy into the weary.

It is another matter to reach Fairbanks from the "outside" after the "freeze up." The shortest route is over the mail trail, by dog sled from Valdez, on Prince William Sound, a weary stretch of 400 miles of mountain and lowland, not to be undertaken by a "cheechaco" (Alaskan tenderfoot) unless he possesses not only the right stuff, but also a reserve fund to call on in time of need. Strange as it may seem, the closing in of winter opens up the country to the "sourdough," for dogs can pull where horses fail, and the prospector with his team and "grubstake" roams at will.

Level spruce-covered ridges rising to bare rounded domes, with horizon lines as straight as a rule, characterize the Tanana gold fields. Gently sloping valleys with hillsides at low angles are seen on every hand, and only a clear day reveals far to the south across the wide valley of the Tanana the snow-capped Alaskan range towering to the clouds and culminating to the southwest in Mt McKinley.

Fools, and many of them, rush into a new mining camp, but the presence of angels would be rather a disturbing element in the general scramble for good "pay." Moreover, their wings would become torn in the brush and their robes muddied by the heavy trails.

Fairbanks is a thriving town of some two thousand souls and growing. In fact, it grows as you watch it, and it grows as you give up the watching and turn for a few moments of sleep. It has not yet, and it is to be hoped never will, bear the name of city, so often ill applied in the northern camps, where each collection of log cabins is dignified by that addition to the name of the first prospector who struck pay. The main street fronting Chena Slough already puts to shame many a town of ten times its age on the "outside."

On the main street alone there are as many as ten saloons, all in active business, to say nothing of the hospital, dwellings, sawmills, drug stores, and commercial companies' posts, where can be bought anything from a paper of pins to a folding bed or from a roll of wall paper to a polished oak dining table. He that imagines that luxury does not exist in our far northern camps would need settle but one small bill for furnishing to become entirely convinced of the luxury of all things, even a sack of flour.

Houses front the slough which would do credit to our eastern shores. Steam laundries vie with the force of muscle in producing the spotless white shirt bosom, and bootblacks at "two bits" a shine, ever ready, await you, that the mud of the trail may be cleaned from your boots before entering your carpeted cabin.

Justice is rendered daily in the court-house (used on Sundays as the church), and if a man's claim be "jumped" he needs but bring suit, and then go seek another claim—"broke."

If you would know the creeks, don't go to them. Enter a saloon, and in five minutes, mid the melodious tones of "Mamie, come kiss you honey boy," screeched from the latest phonograph, and the jostling of the eager crowd about the gaming tables, endeavoring to lose in the shortest possible time their hard-won gold, you will hear more of the "good pay" and rich "fractions" than you could learn in a month at the bottom of a wet drift. "Sell it?" "No; not for $50,000;" and he wouldn't, either, though before the winter is over he'll probably work "day shift" on the end of a wooden windlass hoisting a ten-pan bucket 60 feet at 40° below zero.

The continuous buzz of the sawmills, turning out 50,000 feet of spruce lumber a day, would suggest a western logging camp. Lumber is as essential in mining as is water, and with the prices up to $200 a thousand the owner of a mill needs no gold mine to make his fortune.

Enter a restaurant, and anything from a cup of good coffee, well served, to a four-course dinner is yours. Broiled caribou steak and mushrooms are inviting, served with lettuce and green peas; but don't do it often, or you'll probably work your way out in the fall as a deck hand on a flat-bottom stern-wheeled steamboat bound south.

When you are able to drag yourself from the allurements of the metropolis and start for the creeks, take the ridge trail. Some one may tell you to follow the telephone line, as it is straight. It is straight enough—one of the few straight things in the country, in fact—and the walking is good when you get down to it, but it's a long ways down and you must need make special efforts to extract each separate foot. The ridge road is high and dry, through a stretch of spruce and birch timber, and, if you have dragged yourself through the mud and water of a creek trail, seems a boulevard. The freight of all the creeks passes this route, and the lead horse of a pack train steps aside to let pass the two-ton four-mule freighter as it toils along, jolting over the old roots and stumps of the former wood. Ten miles beyond, in the bottom land at the junction of Gilmore and Goldstream, this same freighter will sink axle deep in the mire, and probably leave half its load by the wayside for a second trip. Little wonder that freight rates are "two bits" a pound, or $500 a ton, a mere bagatelle when your claim carries fifty cents to the "pan," but ruinous when it averages only five.

A newly opened gold placer in an Alaskan camp is far from an inviting sight. Heavy freighting, accompanied with frequent rains, produces in the freshly thawed ground of the creek bottoms a result not conducive to good walking, to say the least, and in a short while the foot trail has spread itself far up on the hillsides in a vain endeavor to find a dry and firm piece of moss upon which to settle. But it is on the creeks that the work begins. The glamor and fascination of the infant

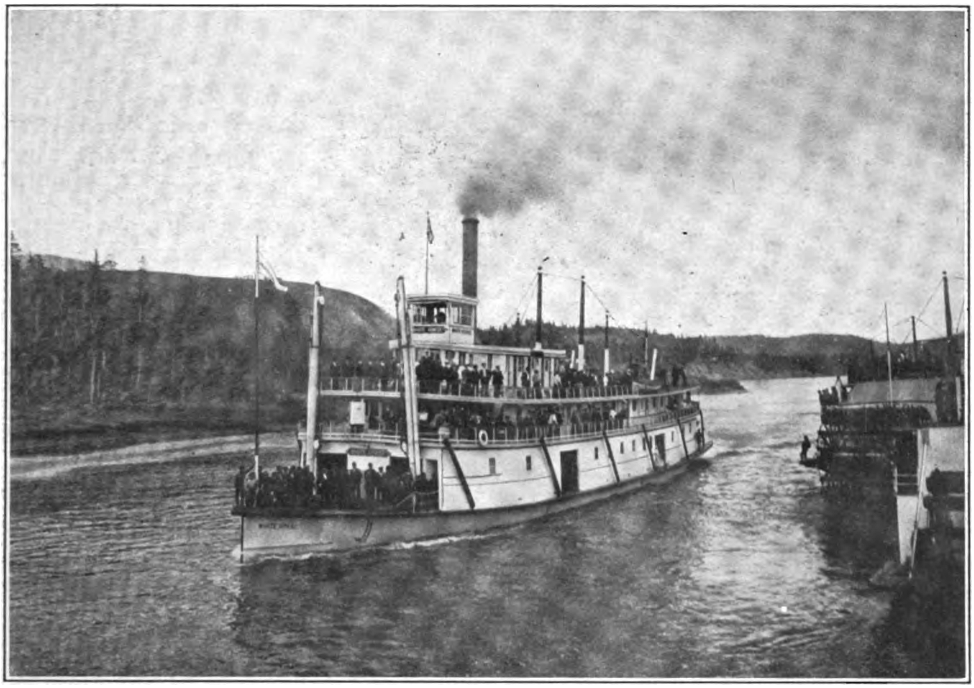


Photo by Sidney Paige

The "First Boat Out" after the Ice. White Horse

city have disappeared, and men shovel and sweat for their daily bread and the other man gets the gold.

Everywhere the sluice box and the piles of "tailings" catch your eye, and the incessant *chug chug* of pumps and dummy engines with the rhythmic dumping of the gravel greets your ears.

Descending one of the many shafts sunk to bed rock through the frozen gravel, the shift boss will show you where the best pay lies, and while you stoop to examine the spot a chunk of the roof may catch you in the back of the neck. But it seldom sloughs off in more than 40-pound pieces, so there is no danger.

The mass of miners are wage-earners, and they earn their wage. To work all day at the end of a No. 2 shovel is not all honey and treacle, nor does it lead to high ideals and gentle philosophy to sweat out your ten hours in a steam-filled drift of frozen gravel forty feet below the creek, and when the whistle blows issue to a hasty wash, a dinner, and a crowded bunk-house. But there is the ever-present possibility of a good strike or a profitable "lay" on a rich claim. The day is 24 hours long and the sun shines most of the time, and when the snow falls and the trail freezes over, the wage-earner is his own master again. With the hard-earned "grub stake" and his team of dogs he hits the trail for the new country, and it is "mush" until the coming spring, when, if he hasn't struck it during the short days of the Arctic winter, he returns to the end of a No. 2 to try it again next fall. Ask as many as you will if they are "goin' out this winter," nine times out of ten the answer comes, "Not till I go with a full poke." And

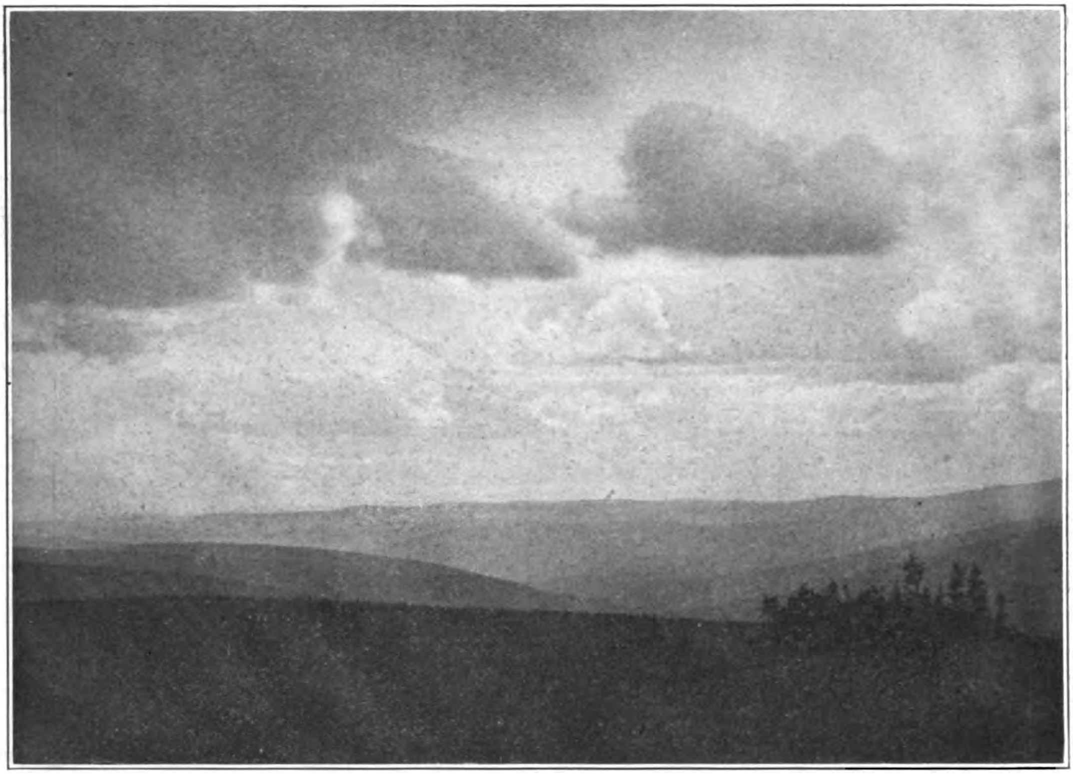


Photo by Sidney Paige

The Tanana Gold Fields

then Seattle and all that goes with it, and broke in a short six months.

The hospitality of the old Alaskan pioneer is proverbial, and in the Fairbanks camp there is many a proof of it. When noontime and a stranger come about the same time the result is a stranger before a full table heaped with all that money and a generous hand can procure in that far-away land ; and even if the miner's ground happens to fall where the bed rock was smooth and the pay had slipped to the claim below and his shelf showed but few fresh cans of "carnation cream," the same hearty welcome would await the newcomer as if the poke were full and hopes high—a meal to share and a blanket in the cabin on the floor. Strong, healthy, cheerful, mostly hopeful, seldom rich, but always hospitable, defines the Alaskan miner.

Cleary, Fairbanks, and Pedro Creek are yet the mainstay of the camp. One claim on Cleary yielded $1,000 a day from the solidly frozen gravel 20 feet below the surface. Confidence is expressed by the fact that several claims during the past summer changed hands at as high a figure as $60,000.

Underground mining, or drifting, as it is termed, is probably the most economic method of extraction on Cleary and Fairbanks Creeks, for the deep, barren overburden of muck and gravel places open-air work out of the question.

The primitive hand windlass is disappearing, its place being taken by the self-dumping carriers and steam hoists. Wood fires are no longer used for thawing, the steam point being far more efficient.

During the night shift the steam points are driven in the face of the drift, and after ten hours' thawing the material is extracted the following day by steam hoist and self-dumping carrier.

Already keen competition is lowering the wage and reducing the cost of supplies, and a reduction in cost of extraction and consequent greater profit is the result. Machinery of the necessary class, boilers, pumps, steam winches, hoists, points, and miners' supplies of all kinds are entering the camp in large quantities. As the cost of mining is lowered, the area of workable ground is increased.

The building of better roads would immensely aid the miner whose ground, though not marvelously rich, still affords good "pay" under more economic conditions. It is probable the gold-producing field will grow, though the test of time is the only reliable one. Certain it is, however, that there exist hundreds of square miles in this region that have barely been scratched, and the hopes and spirits, at least, of the camp are high.

THE INDUSTRIAL TRAINING OF THE GERMAN PEOPLE

ONE of the most important government publications in some time has been issued by the Bureau of Statistics of the Department of Commerce and Labor. It is entitled "Industrial Education and Industrial Conditions in Germany," and contains a number of special reports by our consuls in Germany, which give an excellent and thoughtful appreciation of the rapid growth and prosperity of the German Empire. This progress is due mainly to the thorough training which the German workmen and working women, of high and low degree, have received in the German technical schools, which since the union of the German states, in 1870, have been fostered everywhere by principalities, cities, associations, and private benefactors.

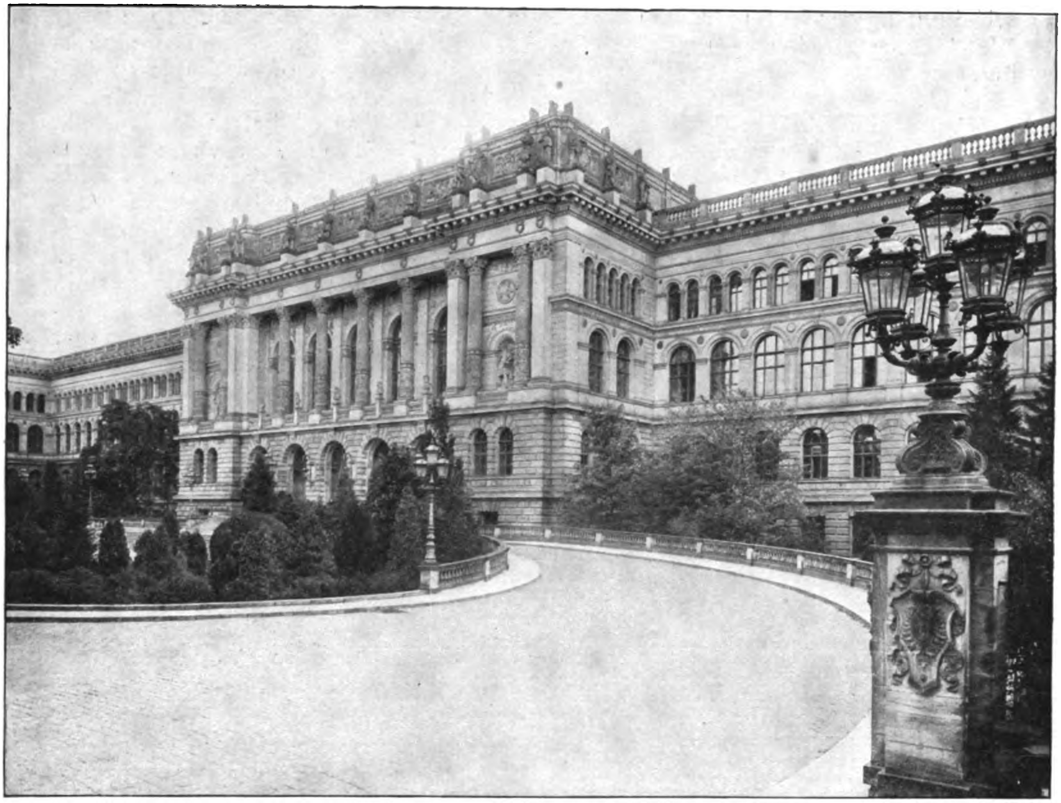
These schools are open, not to a class or to a country, but to the world. In their halls rich and poor meet on equal terms as learners. They require comparatively little money, but educate thousands of hands and heads. They throb with the life about them, and grow with the world without. They are the most powerful weapons of German industry. They are the ironclads of commerce.

A very large majority of the students who attend the trade schools of Germany have had more or less preliminary training and practical experience in the trades in which they desire to perfect themselves.

Almost all trade schools have special workshops or factories associated with the school building.

In them are found the most modern machines, the latest inventions, and the most practical methods. Every movement of the student is guarded, every act is followed, every mistake is corrected as soon as it happens by teachers who have had good preparatory training, who, in most cases, come directly from their trade and who are fresh and up to date in their practice.

How different the situation of the young apprentice in his father's factory. He may be alone at his machine for hours at a time. He may commit a



The Technical High School at Charlottenburg, Germany

legion of errors without detection until the products of his experimentation are placed upon the market, as experience has frequently proved.

Drawing is made a most important branch of study. It lies at the basis of a large majority of advanced studies and is the A B C in the curriculum of many a trade school. In day schools, evening schools, and Sunday schools it is the same thing—drawing! drawing! It is an aid, rather than an injury, to the memory. It trains the mind as well as the eye. It is as great an aid to the reasoning powers as is logic or mathematics.

Experience in Germany apparently shows that, as a rule, those schools which are under private management exact the highest tuition fees and are the most inefficient.

Out of 519 students who attended the commercial high school of Leipzig in 1902–1903 213 were foreigners (110 of these Russians). Another striking illustration is found in the tanning school of Freiberg, Saxony, where 42 out of 76 students enrolled in 1902–1903 were foreigners. In 1903 the ten technical high schools had an enrollment of 2,242 foreigners out of a total attendance of 14,426.

These hundreds of foreigners return to their various countries and there give no mean aid in the development of industries which are in direct competition

The Technical High School at Stuttgart, Germany

with those of Germany. German steel thus meets German steel; German armor, put on in Germany, turns to meet German armor. On the basis of self-protection and national defense the Empire cannot be criticized for wishing to close its industrial institutions to the rest of the world.

Russia probably profits most in this international educational game. Her students are found in institutions everywhere. Through personal contact with some of these the writer was surprised to note their broad intelligence, their mental keenness, and their linguistic accomplishments. Many of these men speak four or five languages with ease.

The Emperor a few years ago issued the watchword, "The future of the German Empire lies on the seas." It had a force similar to Bismarck's famous declaration that "The nation that has the schools has the future." Commerce and industry were the great hope then, and commerce and industry remain the ambition today. Education was chosen as the powerful weapon with which to attain this future. Today this weapon is but just making itself felt. The industrial schools are still young. In the future more will be heard from the young merchants and manufacturers who daily go out from these institutions. The greatest danger of Germany to the world is probably not in war, but in peace. Her energy is turned to conquests in the industrial world. Her marvelous development is industrial, not political.

Such a development may well be respected and feared; and if we would better arm ourselves against industrial encroachments and equip ourselves for a continuance of our present encouraging commercial expansion with the most effective weapons, we would do well to take the example and lesson of Germany to heart by looking seriously and long to our own industrial schools, good though they are, and improving and developing these in the light of American conditions and of foreign experience.

In a comparatively short time Germany has become one of the great workshops of the world, and has secured a place in the front rank of manufacturing nations with but little assistance from nature and in the face of many difficulties. It is not a rich country; its natural resources are moderate; its position is disadvantageous for trading; it has enjoyed peace for but thirty years; it has never enjoyed security, and tranquillity has been purchased at the cost of an immense military burden. In all these matters it presents a striking contrast to the United States, which has had every conceivable advantage. Then its people are not particularly inventive and have not fashioned for themselves superior weapons in the shape of new mechanical appliances and revolutionizing processes, like the earlier inventions of England and the later ones of America. Nor do they possess exceptional skill in special directions like the French. Even in science, wherein their intellectual strength is greatest, they have no general advantage over England and France, for all three countries can show records of equal luster, whether in physical or biological science; and yet Germany has advanced from comparatively small beginnings so rapidly that she now does what no other country, though possessing superior advantages or fewer difficulties, can do; she successfully challenges England in nearly all the great branches of industry in which England is or was the strongest. Other countries challenge in this or that or they have special lines of their own; Germany is an all-round competitor, and the most formidable we have; and not we only; she competes with other countries in the products in which they are strongest—with the United States in electrical machinery and small machine tools, with France in dress materials, as she does with England in shipbuilding and large machinery. To complete the tale, I must add that while doing this and maintaining the most powerful military system in the world Germany has at the same time modernized, regulated, and improved the conditions of civil life more completely than any other country. She has done all those things in the way of sanitation, public health, street architecture, and public order that other rising industrial countries, and conspicuously the United States, have been too busy to do.

PHILIP NOLAN AND THE "LEVANT"

THE curious paper which Dr Hague has printed in the NATIONAL GEOGRAPHIC MAGAZINE for December closes with a reference to a story which I wrote in the year 1863 called "The Man Without a Country." That story begins with these words:

"I suppose that very few casual readers of the New York *Herald* of August 13 observed, in an obscure corner among the 'deaths,' the announcement, 'Nolan. Died on board the United States corvette *Levant*, latitude 2° 11′ S., longitude 131° W.'"

I had full right to say that very few

readers observed it, because nobody observed it. The story was a fiction, and with the right of an author of fiction I made this statement, which is unequivocally true.

I speak of this with a certain sensitiveness, because I have been accused of being a forger and counterfeiter for using such language. But it is one of the privileges of authors of fiction to make their narrative as plausible or probable as they can, if they give sufficient clues to the reader, from which he may know that he is reading fiction. In this case I began by placing the supposed action of part of the book on board a ship which had disappeared more than two years before. I knew that she had disappeared, the Navy Department knew she had disappeared, all well-informed readers knew that she had disappeared. Even among four thousand newspapers in the country the editors of two knew that she had disappeared. With my eyes open I intentionally gave this ready clue to any careful reader, that from the beginning he might know that the story was a parable; and if there are any of such croakers left, as I suppose there may be in the office of one newspaper known to me, I will say to them that from the time of the Pharaohs down parable has been a method of instruction employed by teachers, even of the highest distinction.

The Navy Department did not know where the *Levant* disappeared. All they knew was that Captain Hunt, of the *Levant*, was under orders to proceed as rapidly as possible from Hilo to the American coast, and that he started out to obey these orders, and the ship has never since been heard from by any trace whatever, unless it be in certain wreckage found on the south shore of Hawaii in June, 1861.

The Navy Department knew this, but I did not know it. I only knew that she had disappeared somewhere in the Pacific Ocean two years before.

To carry out the specific purpose to which I have alluded I meant to have these latitudes and longitudes indicate a spot high on the Andes. It was more than twenty years afterward that I found that in some accuracy of some proof-reader, possibly by some blunder of mine, the spot indicated is in the Pacific Ocean, where I did know she had disappeared. But alas the manuscript copy is lost and I cannot find who made this change. This is in point of fact not far from the Marquesan Islands, and, oddly enough, in the story Nolan is supposed to have been at those islands with Essex Porter. But I had nothing to do with this. I placed the ship on the Andes with the specific purpose which I have named.

I should perhaps have never discovered my own error but that many years ago my friend, James D. Hague, who knows the bottom of the Pacific better than I do the surface of the United States, called my attention to the instructions which Captain Hunt had on his last voyage in the *Levant*. I had never looked for those instructions, having no occasion to for my purpose. It seems that Mr Hague was in Honolulu at the time when the *Levant* sailed; that Hunt was his friend, and that they bade each other good bye on the day of her parting. As the reader knows, she was never again heard of but from the silent record of the spar which has been found on the island of Kaalualu. But Mr Hague has brought together in his interesting paper the evidence which shows that almost certainly Hunt intended to sail on a line nearly east from the Hawaiian Islands. In that region on any of the more recent atlases there is a spot of blue water. On Rand and McNally's elegant atlas of the world I find not a speck for thirty degrees of north latitude from the equator, for twenty degrees of latitude south of the equator. On the old Spanish charts, however, and on charts copied from them Mr Hague and the officers of marine hydrography have found indications of reefs and even islands. One of the last of them is De Graves's Island of 1859. Almost anywhere in this area, itself larger than some of the smaller planets of the solar system, the bones of the *Levant* may lie. In this region, as the map on page 479 of the NATIONAL GEOGRAPHIC MAGAZINE shows, five degrees of longitude and two of latitude have now been searched in vain.

Mr Hague, however, is kind enough to assure me that if my fictitious character, Philip Nolan, ever had some subliminal form he or his spirit, if they were on the *Levant*, may still haunt the reef or atoll under the shadow of cocoanuts or bananas or bread-fruit trees. Nolan would have been twenty-five years old in the year 1805. Thus his one hundred and twenty-fifth birthday would be found in this year. If the climate is healthy for subliminal people, Dr Hague assures me that if I will land with him on that reef I may meet for the first time in the flesh and blood the somewhat bended form of my old hero. He will forgive me that I placed him on the Andes, where men do not live so long.

It may be well to repeat Mr Hague's summary :

"The cruise of the *Tacoma* has therefore negatively and conclusively disposed of half a dozen or more reported islands as charted in certain defined positions, and it has definitely eliminated from further consideration of doubtful reports an area of about 10,000 square miles, leaving a still questionable region of twice or three times that area open to further search."

EDWARD E. HALE.

PROGRESS IN THE PHILIPPINES

UNDOUBTEDLY that part of the Report of the Philippine Commission for 1904 which will most strongly appeal to us is the account given of what is being done to develop the resources and capability of the people. Scientific agriculture, which is doing so much for the United States, will soon, at small expense, increase many times the return of every farmer in the islands. The government experts are introducing American machinery, improved varieties of plants, and new animals and new crops. The natives seem to appreciate very quickly that greater intelligence in their work means not only greater returns in money, but also shorter hours of work.

Filipino labor is abundant and satisfactory. The chief of the Bureau of Agriculture was at first ridiculed when he insisted that Filipinos must drive the teams and do the plowing on the government farms, but they are now doing it on every farm controlled by the bureau. Furthermore, they are doing it as well as Americans ever did and at prices amounting to but 6 to 10 per cent of what it formerly cost to get Americans to perform the same work.

A steam thresher, introduced by the bureau, got so much more rice from the stalks than the natives had been accustomed to obtain by tramping it out under foot after it had stood for weeks and been subject to the depredations of thieves and rats that they at first conceived the idea that rice hidden inside the separator was allowed to flow from the spout of the machine, thus augmenting the real output.

A period of three months is ordinarily consumed in threshing rice by native methods, and 25 per cent of the crop is often lost. Native methods of hulling and cleaning are very crude and the valuable by-products are all lost, while rice threshed by steam power is ready to go to the cleaning mill at once, and 20 per cent of the rough rice is saved in bran and polish, which make excellent cattle food. The rice crop being thus quickly disposed of, the farmer and his laborers have time to put in other crops. Several steam threshers have been bought by Filipino farmers.

Experiments in growing Indian corn have been successful. A crop may be matured in less than three months. The meal, pound for pound, is more nutritious than rice. The average rice crop, which requires six months to grow, does not yield more than 750 pounds of cleaned rice per acre, while the average corn crop is 15 bushels per acre, which is more than equivalent in food value to 750 pounds of cleaned rice. It is apparent, therefore, that the successful stimulation of corn production will greatly increase the available food supply.

Attempts are being made to use the castor bean, which grows all over the islands. Little use heretofore has been made of its fruit, while much castor oil is imported at a high price. Press cake obtained from this bean is worth approximately $20 gold per ton for fertilizer.

The stimulation of cocoanut production, at present a source of considerable wealth to the Philippines, has been begun. The trees thrive on ground which is worthless for other purposes. They require comparatively little care, and when grown in large numbers are not often seriously injured by the attacks of insects or by unfavorable climatic conditions other than long-continued drouth. At present nuts are, as a rule, planted haphazard, without regard to the productivity of the trees from which they come. Plantations are cultivated little, if at all. Fruit is often harvested before maturity; no use whatever is made of the husk except for fuel. Copra is sun dried at considerable expense and with constant risk of heavy loss from sudden showers, or, during the rainy season, is placed in bins and smoked over slow fires; naturally the product is of a very inferior quality.

It seems that certain trees make excellent growth and fruit heavily when planted in sea sand, which is almost without plant food, provided their roots are laved by the rising tide and the sea breeze fans their leaves. Should it prove that their ability to live and flourish is dependent upon the presence of a nitrogen-producing organism capable of cultivation and distribution, so that the barren wastes of sand along our long coast can be made to produce cocoanuts advantageously, it would obviously be more economical to plant them there than to give up rich soil to their cultivation and incur the expense of purchasing and using artificial fertilizers.

It is found that horses and mules stand the heavy work on the rice farm as well as in the Southern States of America. A native teamster with 4 mules plows 4 acres of land per day, while a native plowman with 4 Chinese oxen plows 2½ acres per day. The ordinary Filipino, using 2 carabaos, is able to plow about one-fifth of an acre per day; he must have two carabaos however, in order that they may be interchanged every two or three hours and allowed to get their mud baths, without which they soon become incapacitated for work.

The archipelago has a coast line more than double that of the United States, and not more than 10 per cent of this has been adequately charted. The exact geographical situation of a great portion of the east coast of the islands has never been determined, and there has been considerable uncertainty in regard to many other points. Much has already been accomplished by the Coast and Geodetic Survey, nearly 100 topographic sheets having been issued.

With the opening of the Pacific Cable the exact longitude of Manila has been determined from San Francisco during the year, and several other points hitherto in doubt have been cleared up. The bureau will compile data from which it will eventually plot an accurate coast line. In two cases the actual surveys show a discrepancy of nearly four miles over the previous reports.

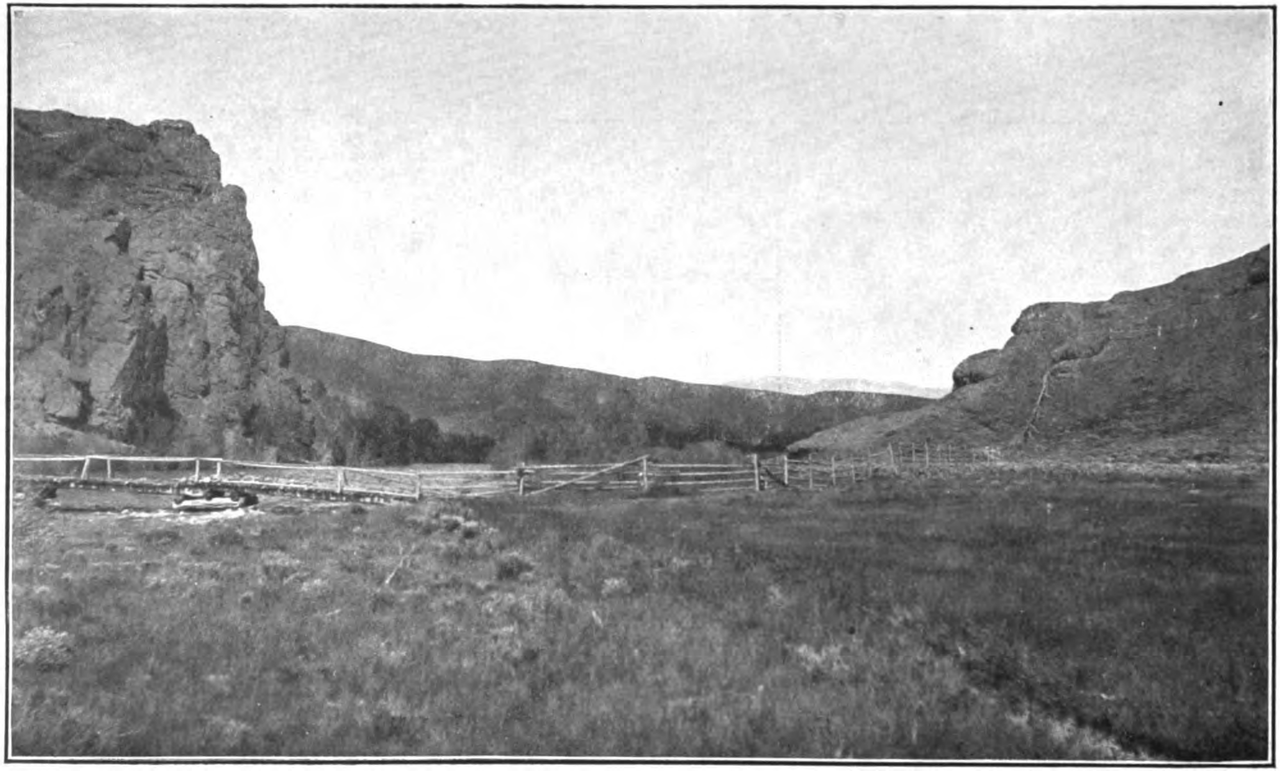
THE GARDENS OF THE WEST

THERE is now lying in the Treasury vaults the sum of nearly $30,000,000, which is reserved exclusively for the government irrigation projects of the West. This immense sum has been realized during the past three and one-half years from the sale of public lands, and the amount is increasing daily at a very rapid rate. Work has already been begun on eight great projects which will make gardens of nearly one million acres, an area equal to the State of Rhode Island and probably capable of generously supporting a population of several million people.

From F. H. Newell, U. S. Geological Survey

Salt River Canyon, Arizona

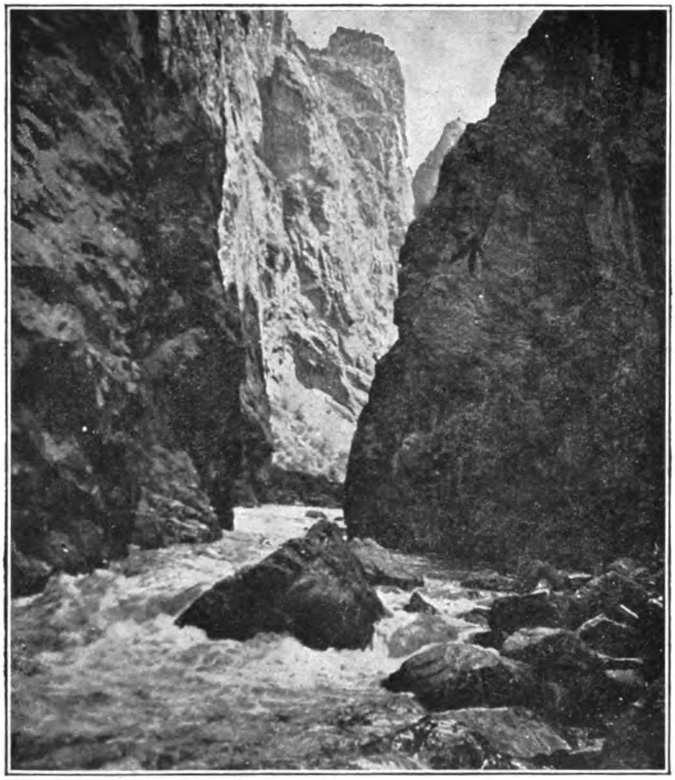
Looking down stream from point about half a mile above dam site. A giant dam 240 feet high and costing $3,000,000 is to be built across the canyon. The water is reserved for Phœnix, 60 miles down the river, where about 200,000 acres will be irrigated. The project also includes a series of power plants which will supply water to nearly 60,000 acres in Salt River Valley.



From F. H. Newell, U. S. Geological Survey

A Typical Dam Site, Windy Gap, Colorado

The proposed dam would stretch from hill to hill



From F. H. Newell, U. S. Geological Survey

Site of Proposed Dam in Gunnison Canyon, Colorado

The precipitous canyon walls are 2,000 feet high. It has been decided to build a dam across the canyon and then to bore a tunnel through the canyon wall just behind the dam, which will carry water to Uncompahgre Valley. The men who took this photograph were lowered hundreds of feet by ropes. See the NATIONAL GEOGRAPHIC MAGAZINE, January, 1904, page 27.

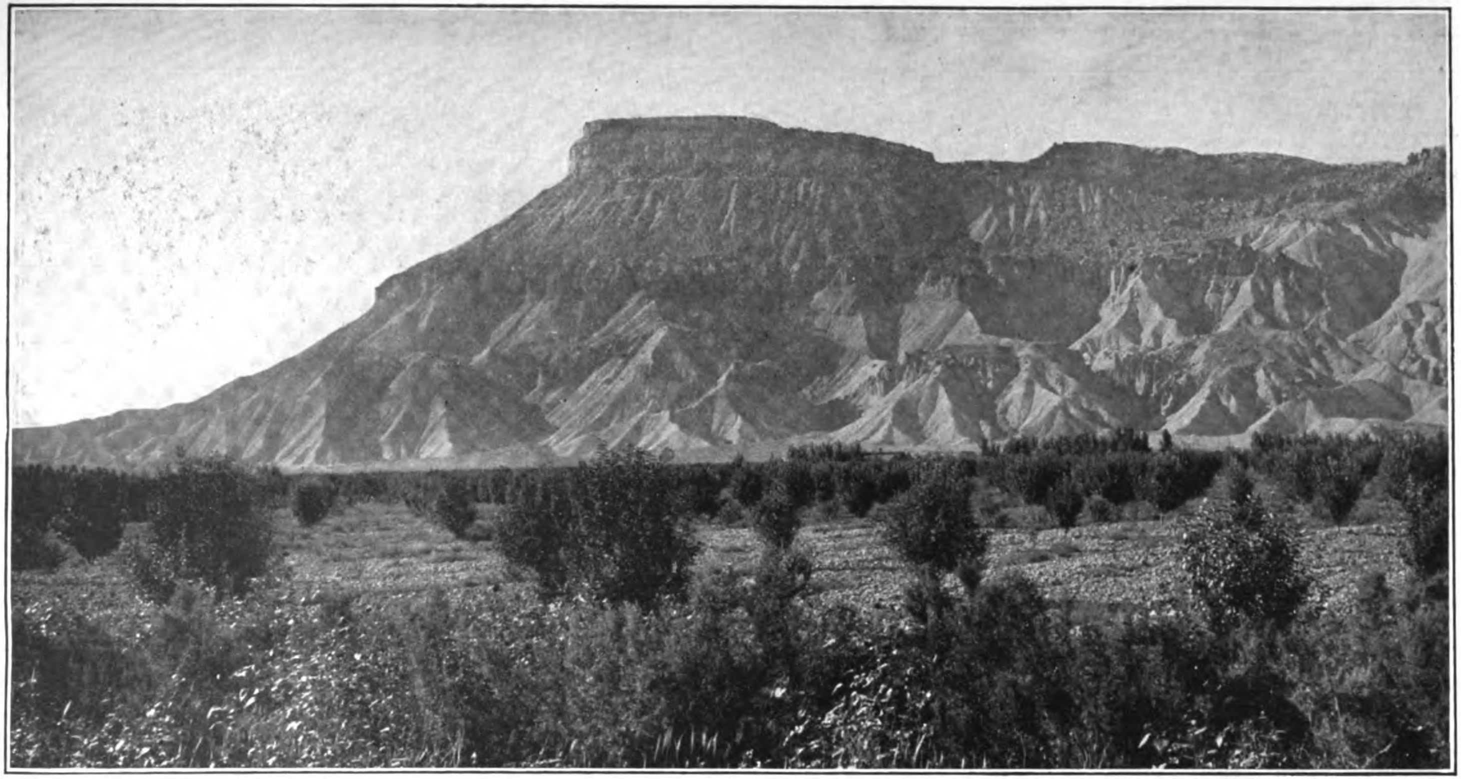
The projects already commenced are :

State.	*Project.*
Arizona . .	Salt River.
California .	. Yuma.
Colorado . .	Uncompahgre Valley.
Idaho . .	. Minidoka.
Nebraska . .	North Platte
Nevada . .	. Truckee-Carson.
New Mexico .	Hondo.
South Dakota	. Belle Fourche.

The following projects, to irrigate another half million acres, have been approved and will be soon commenced:

State.	*Project.*	
Montana . .	Milk River.	
North Dakota .	Fort Buford.	
Do. . . .	Buford Trenton	Pumping.
Do. . . .	. Bismarck . .	
Washington .	Palouse.	
Wyoming .	. Shoshone.	
Oregon . .	Malheur.	

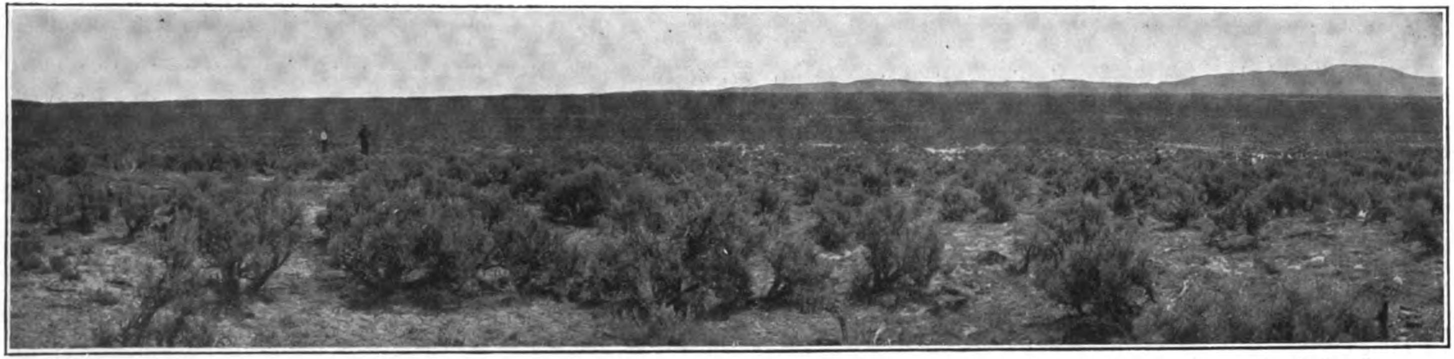
The Third Report of the Reclamation Service, F. H. Newell, Chief Engineer, now in press, contains an interesting comparison of the relative cost to the public of government and private



From F. H. Newell, U. S. Geological Survey

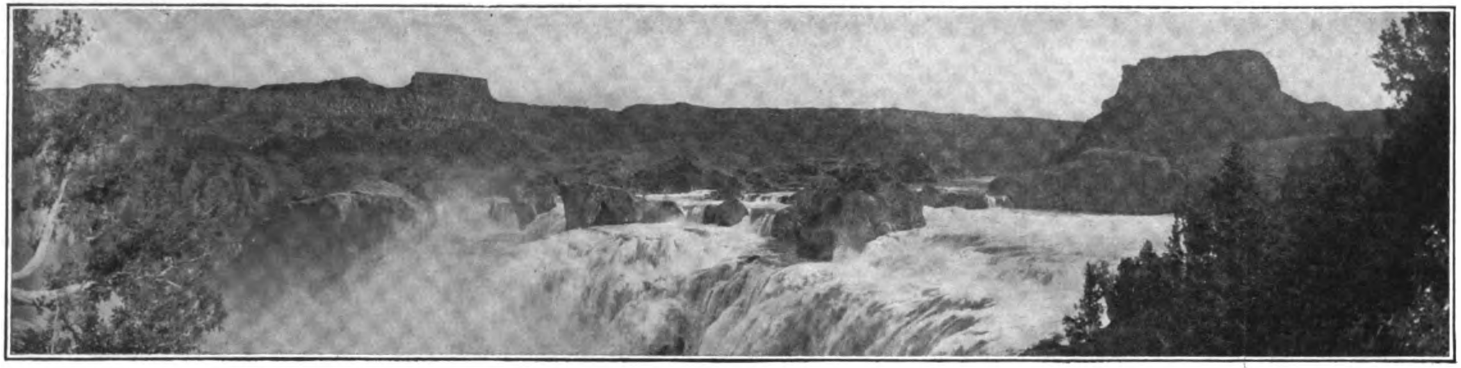
Garfield Point in Grand River Valley, Colorado

This valley is one of the garden spots of the world. A large portion is already well irrigated. It is proposed to construct works to irrigate about 700,000 acres more



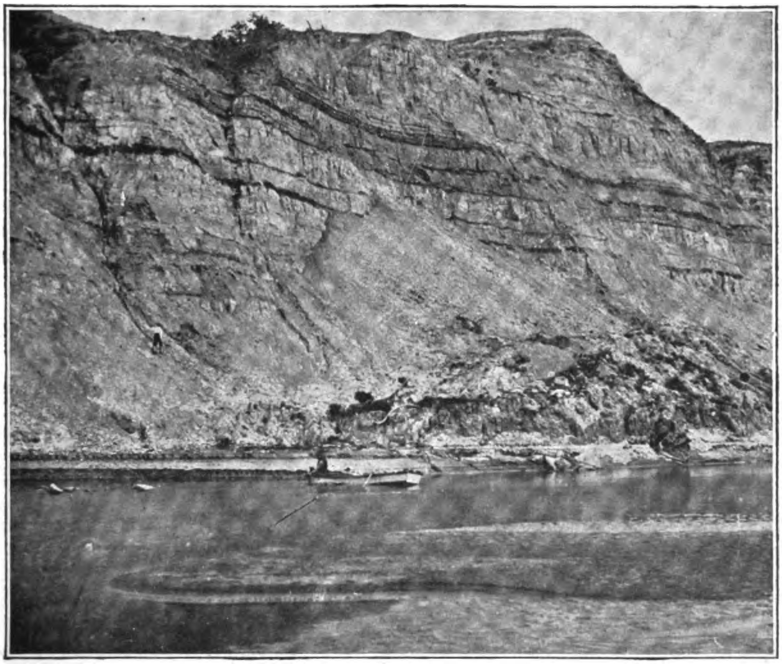
Sage Brush Deserts (Minidoka Land) South of Snake River, Idaho

About 85,000 acres of this rich soil is to be reclaimed



From F. H. Newell, U. S. Geological Survey

Shoshone Falls, Snake River, Idaho



From F. H. Newell, U. S. Geological Survey

Fifteen Lignite Beds in Single Section of Little Missouri River near Johnson's Ranch, North Dakota

There are about 250,000 acres along the Little Missouri River in North Dakota which if reclaimed would make ideal farms. This large area is, however, distributed in small terraces, none over 15,000 acres in extent, from 50 to 100 feet and more about the river bank, so that if it were not for the very lucky deposits of fairly good coal along the river it would not pay to reclaim any of them; but with this coal pumping plants can be very cheaply operated. The Reclamation Service has already approved projects to reclaim two terraces on the river.

irrigation works. By the terms of the reclamation law the cost of every irrigation enterprise constructed by the government must be paid back by the people benefited within ten years after completion of the work. The repayment is made by installments. As the government charges no interest and seeks no profit, government irrigation works cost the people considerably less than works built by private corporations. The illustrations on pages 118 to 124 have been chosen to show the stupendous magnitude of some of the projects and the natural difficulties that have to be overcome. Irrigation on such an enormous scale has never been undertaken in the history of the world.

The reclamation law is working admirably. It is elastic and equally fair to all sections. Too much confidence and praise cannot be given Mr Newell and his efficient corps of engineers for the ability and good judgment with which they are carrying out the provisions of the law. The picture on page 120 shows that not only engineering skill but courage and coolness are constantly needed to solve the many varied problems of the work.

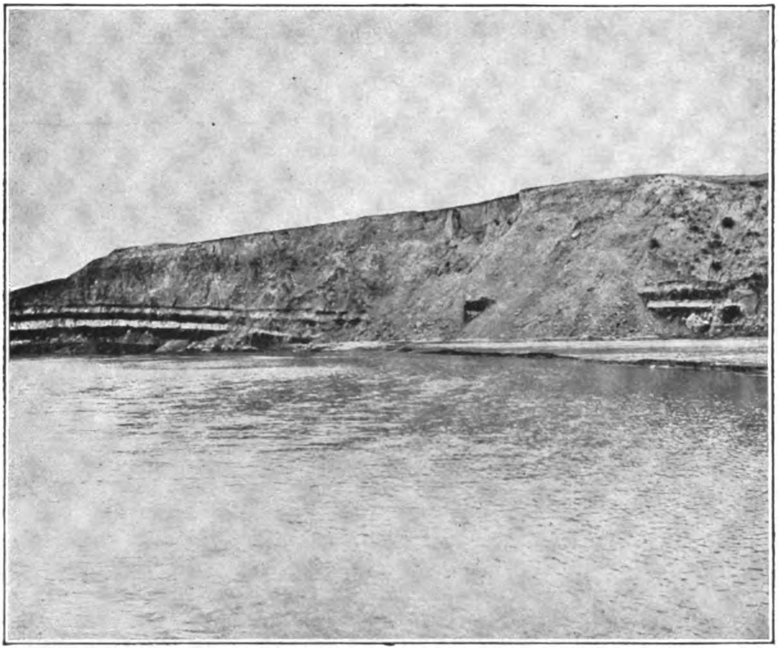
THE CAUSE OF THE EARTH'S HEAT

PROF. ERNEST RUTHERFORD contributes to *Harper's Magazine* for February an intensely interesting article on the cause of the earth's heat, which he is inclined to believe is radium. From his article we may draw much comfort, for whereas Lord Kelvin and later scientists have been arguing that all of our descendants must become extinct in about five million years, Prof. Rutherford gives the hope that our race may hold out for five hundred millions of years, which is quite a bit longer. All estimates, of course, are based on the duration of the heat from the sun. Our new knowledge of radium seems to show that the sun's heat is diminishing much more slowly than has been generally supposed.

After describing the heat inside the earth and the various present theories to account for this heat, Prof. Rutherford proceeds to tell some of the remarkable characteristics of radium.

"In the course of a year one pound of radium would emit as much heat as that obtained from the combustion of 100 pounds of the best coal, but at the end of that time the radium would apparently be unchanged and would itself give out heat at the old rate, and it would emit heat at the above rate for about one thousand years."

The heat which radium gives off seems to be caused by the breaking up of the radium atom into tiny particles, which fly away with tremendous velocity; but notwithstanding their great speed, most



From F. H. Newell, U. S. Geological Survey

Four Coal Beds each 4 or 5 Feet Thick on Little Missouri River, near Mikkelson, North Dakota. See preceding page of the particles are caught by the outer walls of the atom and their energy of motion converted into heat. "The radium, in consequence, is heated by its self-bombardment."

The emanations of radium and of other radioactive substances are present everywhere in the atmosphere. Every falling raindrop and snowflake carries some of this radioactive matter to the earth, while every leaf and blade of grass is covered with an invisible film of this radioactive material. These emanations are not produced in the air itself, but are exhaled from the earth's crust, which is impregnated with radioactive matter.

The question, then, arises, Is the amount of radioactive matter present in the earth sufficient to heat it to an appreciable extent? Prof. Rutherford believes that it is. The present loss of heat from the earth is equivalent, he says, to that supplied by the presence of about 270,000 tons of radium, which, if distributed uniformly throughout the earth's crust, corresponds to only five parts in one hundred million million per unit mass. The radioactivity observed in soils corresponds to the presence of about this proportion of radium.

According to Prof. Rutherford's view, the present internal heat of the earth tends to be maintained by the constant evolution of heat by the radioactive matter contained in it. The calculations of the age of the earth made by Lord Kelvin, which were based on the theory that the earth was a simple cooling body, in which there was no further generation of heat, cannot, then, apply, for the present temperature gradient of the earth may have been nearly the same for a long interval of time.

The new knowledge which the discovery of radium and of its properties has given inclines the author to the theory that there is available in the sun a vast store of atomic energy. "If ordinary matter in breaking up emits as much heat as radium, then it can be deduced that the duration of the sun's heat would be prolonged for about one hundred times the estimate founded on the condensation theory. . . . If this heat of atomic disintegration is available, it would suffice to keep up the present output of energy from the sun for about five thousand million years, a period of time which probably both geologists and biologists would consider sufficient for the processes of organic evolution, while the duration of the sun's heat in the future may possibly be extended for a hundred times the estimate made by Kelvin."

GEOGRAPHIC NOTES

MAPS RECENTLY ISSUED BY THE GEOLOGICAL SURVEY

THE Batavia quadrangle, situated in western New York, in Genesee and Wyoming counties. It embraces an area of about 220 square miles. In addition to Batavia, a town of about 10,000 inhabitants, the smaller villages of Bethany, Pavilion, Wyoming, Dale, Linden, Lagrange, and Warsaw are shown on the map.

The Greene quadrangle of New York, including a portion of Chenango, Broome, and Cortland Counties. The area represented includes the thriving village of Greene, in Greenetown; portions of the towns of Smithville, German, and McDonough, in Chenango County; the village of Whitney Point, in the town of Triangle; portions of the towns of Barker, Nanticoke, and Lisle, in Broome County; the town of Willet and portions of the towns of Cincinnatus, Freetown, and Marathon, in

Cortland County. This region is accounted one of the best dairy sections in the state.

The Vina quadrangle of California. The area represented embraces about 150,000 acres in the most fertile part of the Sacramento Valley, including portions of Tehama, Butte, and Glenn Counties.

The Kaweah quadrangle, in California. It takes in the eastern slope of the Sierras and covers a country that ranges in elevation from 500 or 600 feet above sea-level in the valleys of the west to 12,400 feet, the height of the summits in the northeast part of the quadrangle.

The Lake City quadrangle, in Colorado. The range of altitude in the quadrangle amounts to over 6,300 feet, extending from an elevation of about 8,000 feet above sea-level on the Gunnison River, in the northeastern portion of the quadrangle, to the summit of Uncompahgre Peak, the loftiest point in southwestern Colorado, a massive mountain that rises to a height of 14,306 feet.

The Niwot quadrangle of Colorado. Besides the oil wells in the southwestern part of the quadrangle, this area contains extensive coal mines.

Longmont, the most important town of the quadrangle, is the center of extensive sugar-beet and canning industries. The whole quadrangle is covered with fine farms, on which large crops of hay, alfalfa, and fruit are raised. The high degree of cultivation seen here is due to an extensive system of irrigation. The water for this purpose is taken from Boulder, Lefthand, and St Vrain Creeks.

The Osoyoos quadrangle, in Okanogan County, Washington. This quadrangle, which lies immediately south of the international boundary line and west of the Republic quadrangle, embraces an area of nearly 800 square miles.

The Ovando quadrangle, in Montana, about two-thirds of which is in the Lewis and Clarke Forest Reserve, just west of the Continental Divide in northern Montana.

Weston and Vadis quadrangles, in West Virginia, which include portions of Harrison, Upshur, Lewis, Doddridge, and Gilmer Counties, constituting a region that is interesting for its undeveloped coal fields.

Salineville quadrangle, which is situated in the east central part of Ohio. It embraces about 226 square miles and contains portions of Columbiana, Carroll, and Jefferson Counties.

The topographic maps of the United States Geological Survey have gained wide popularity in the last nine years. Whereas only 86,974 maps were distributed in 1895, there were 501,775 maps sent out in 1904. These were distributed as follows: through retail sale, 47,906; through wholesale sale, 293,653; through members of Congress, 27,987; to libraries and institutions, 75,112; for official use, 57,117. Although the retail price of each map is only five cents and the wholesale price but two cents, the considerable sum of $8,976.36 was received for maps.

NOTES FROM OUR CONSULS

THE following consular reports give facts of interest in different parts of the world. Persons may obtain from the Bureau of Statistics copies of these reports, as long as a limited edition will permit, by giving the number of the report desired:

Damascus-Mecca Railroad, No. 2191.—The road has been completed as far as Ma'an, 300 miles south of Damascus.

Trade and Possibilities of Arabia, No. 2190.—Probably few people except the Germans realize the possibilities of Arabia. With irrigation and railways the country could be vastly developed.

Trade of Japan During the War, No. 2190.—The exports increased $15,000,000 and the imports $25,000,000 during 1904. The total foreign commerce of Japan for 1904 reached $34,000,000.

Reclamation of Mesopotamia, No. 2186.—Chaldæa, once the richest and most coveted part of the East, but long stagnant and desert, is on the eve of being made fertile again.

Simplon Tunnel, No. 2181.—The longest tunnel in the world, 12½ miles, is nearly completed.

Yukon Territory, No. 2179.—The territory produced $93,025,000 during 1898–1903, of which $65,046,178 went to the assay offices at Seattle and San Francisco. Of the 12,000 population, 7,200 are Americans.

Cotton Culture in India, No. 2179.—Attempts to grow the long-staple Egyptian cotton have been unsuccessful. India, the second cotton-growing country of the world, produces 2,000,000 bales a year as against an average of 10,000,000 bales in the United States.

Railroads in China, No. 2179.—A number of concessions for new railways have been granted.

Development of Korea's Resources, No. 2178.—Next to the Japanese and Chinese, Americans far outnumber every other nationality in Korea. The American electric railway and electric light and telephone systems at Seoul are very successful.

Grand Trunk Pacific Railway, No. 2178.—The plans for this splendid new line are rapidly nearing completion.

Commerce and Industries of Korea, No. 2176.—1904 was the most prosperous year in Korea's history. She has not been troubled by the war, but has received large sums for her laborers and supplies.

Railroads in Korea, No. 2177.—The Seoul-Fusan line is completed, that from Seoul to the Yalu nearly completed, and the line from Seoul to Gensan progressing.

Future of Liberia, No. 2172.—The climate is comparatively good, the resources awaiting development many, and the ultimate future reported bright.

Agricultural and Commercial Conditions in Southern Brazil, No. 2171.—A scarcity of labor is handicapping this section, which is one of the most progressive and prosperous in South America.

Russian Crops in 1904, No. 2154.—The Russian crops in 1904 are officially reported as having been considerably larger than the average in recent years.

Commerce and Industries of Cuba in 1904, No. 2149.—Exports from the United States to Cuba in 1904, the first year under the new reciprocity treaty, amounted to $32,000,000, and were larger than in any earlier year in the history of our trade with that island, and were 38.9 per cent in excess of those of 1903.

The World's Silk Production, No. 2130.

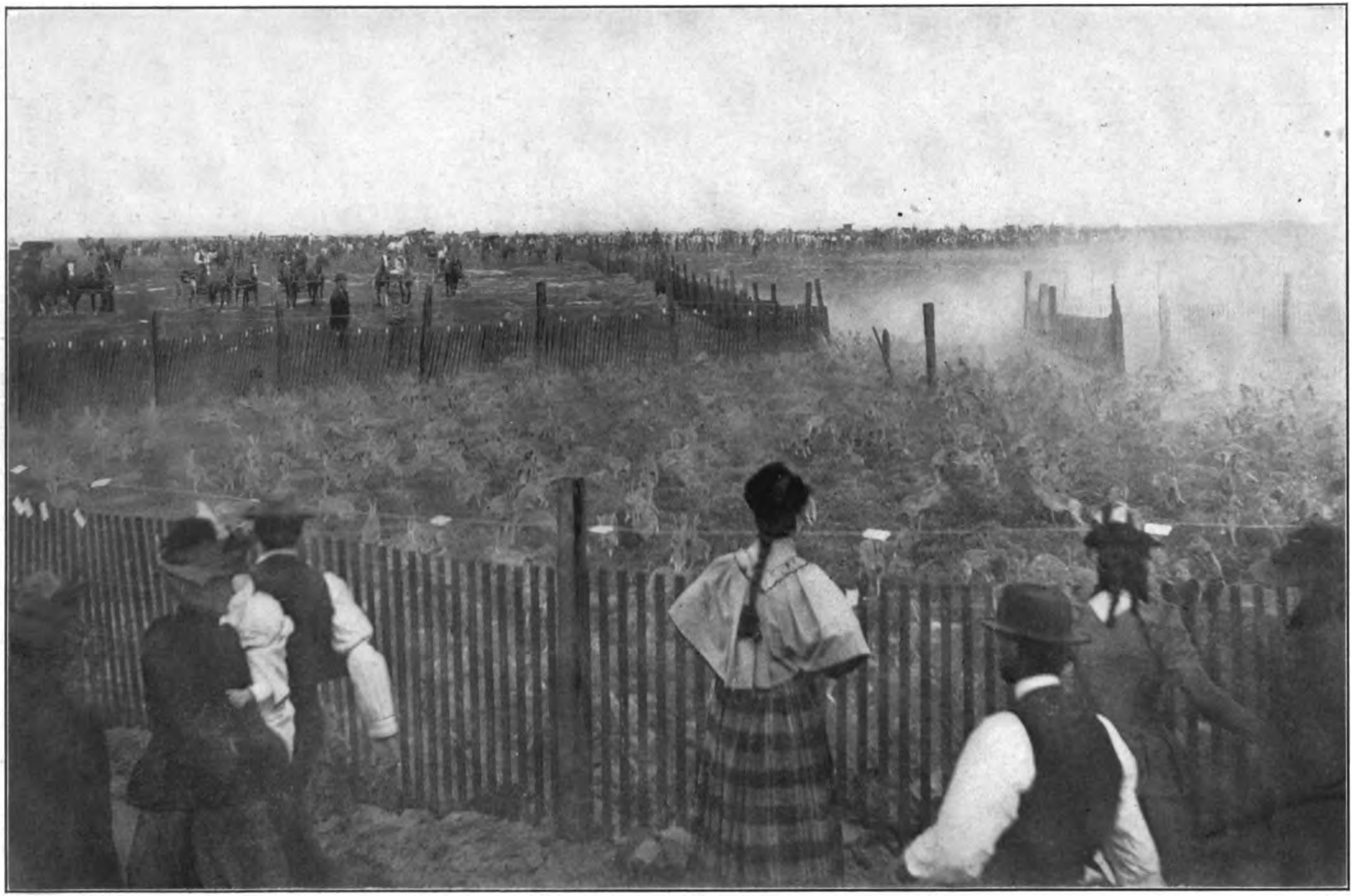
Panama's Commerce, No. 2130.

WORK OF THE COAST AND GEODETIC SURVEY

MR O. H. TITTMANN, in his report for 1904 as Superintendent of the U. S. Coast and Geodetic Survey, announces the completion of the determination of the difference of longitude between San Francisco, Cal., and Manila, P. I., thus connecting the longitude circuit around the earth. This work was made practicable by the generous coöperation of the officers of the Commercial Pacific Cable Company, who placed their cables and operators at the service of the Survey. Incidentally, during the progress of this work, the longitude of Honolulu, Hawaii, of Midway Island, and Guam Island were determined.

The triangulation along the ninety-eighth meridian was extended toward the north and toward the south from the portion already completed, the total extension amounting to 500 kilometers along the meridian, and the work was in progress at the close of the year.

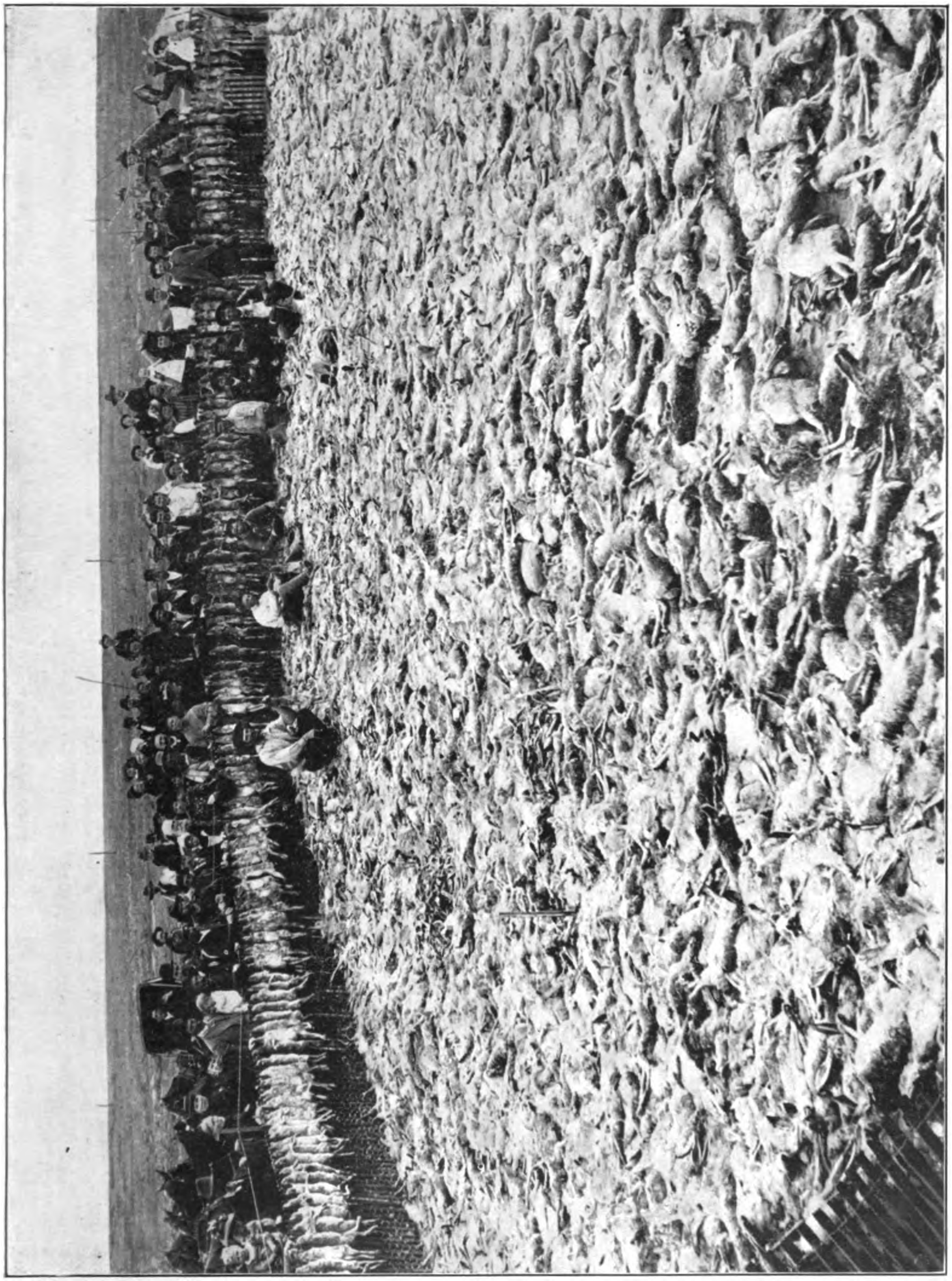
The location on the ground and marking of the boundary between Alaska and the British possessions, as laid down by the Alaska Boundary Tribunal, was inaugurated under the direction of the



From T. S. Palmer, Department of Agriculture

A Rabbit Drive in Southern California

The depredations of the jack rabbits in the Southwest have been greatly checked by these drives. Several years ago the rabbits were a veritable plague, but the severe measures shown in this and the succeeding picture have given considerable relief, so that these drives are no longer a yearly necessity.



From T. S. Palmer, Department of Agriculture

The Results of a Rabbit Drive in Southern California

Persons who would like the details of these drives are referred to an admirable report on the subject by Dr T. S. Palmer, which was published some time ago by the Biological Survey

Department of State by the Superintendent as Commissioner of the United States in coöperation with the Commissioner of Great Britain.

The various operations of the magnetic survey of the country show a gratifying progress during the year. The determination of the magnetic declination, dip, and intensity was made in 327 localities, embracing 367 stations, distributed over 24 states and territories and 2 foreign countries. An extensive investigation was made of the marked local disturbances in the vicinity of Juneau, Alaska, 45 stations being occupied for this purpose. In coöperation with the Louisiana Geological Survey, the magnetic survey of the state was completed. Effective coöperation was secured with an expedition sent to the Bahama Islands by the Baltimore Geographical Society, and valuable results were thus obtained without expense to the Survey.

Excellent progress was made in securing magnetic observations at sea during the voyages of the ships of the Survey to and from their fields of work. In the Atlantic and Pacific Oceans 92 results of magnetic declination and 33 results of magnetic dip and intensity were thus obtained, nearly all of them derived from complete swings of the ships forward and back.

Continuous records of the variations of the magnetic elements were secured throughout the year at five magnetic observations situated at Cheltenham, Md.; Baldwin, Kans.; Sitka, Alaska; near Honolulu, Hawaii, and Vieques, P. R. During the year a large number of magnetic storms were recorded, the most remarkable one occurring October 31–November 1.

During the year a bureau of international research in terrestrial magnetism was created by the Carnegie Institution of Washington, with an officer of the Survey, the inspector of magnetic work, in charge as director.

A continuous record of tide observations with self-registering gauges was obtained during the year at 8 stations, including 1 station at Hawaii and 1 in the Philippine Islands, and for a portion of the year at an additional station which was established on the Gulf of Mexico, at Galveston.

The electric tide indicator installed in the Maritime Exchange at Philadelphia continued to give satisfaction. A similar apparatus was installed during the year in the Maritime Exchange at New York.

The tide indicators established for the use of mariners in New York harbor, in the Delaware River at Reedy Island, and in San Francisco Bay continued in operation during the year.

Compass deviation ranges were established by marks placed on the inner Delaware breakwater, which will prove of great value to shipping, as any vessel can now determine the corrections to her compass while swinging at anchor in the national harbor of refuge.

The field work necessary for the revision of two volumes of the United States Coast Pilot, covering the coast from Point Judith, R. I., to Chesapeake Bay entrance, Virginia, was completed.

Hydrographic surveys were made in 16 states and territories, topographic surveys in 9, triangulation in 14, and leveling in 6.

The primary triangulation along the Pacific coast north of San Francisco was continued.

In Alaska a survey was made of Davidson Inlet, work was continued in Prince William Sound, and two vessels were dispatched to make a survey of Kiska harbor, Aleutian Islands.

In Porto Rico hydrographic work was continued in the harbors and bays and offshore.

The experts of our Department of Agriculture are constantly on the hunt for

From David G. Fairchild, Dept. Agriculture

Stripping the Bark from a 9-year-old Wattle Tree

new species of plants which can be grown profitably in the United States or in our island possessions. One of the latest suggestions is that the Australian wattle tree, which gives excellent bark for tanning purposes and which grows nearly as rapidly as the bamboo, requiring little care, be introduced into Hawaii. A bulletin on the subject by David G. Fairchild has been published by the department. The accompanying illustration shows a laborer stripping the bark from a wattle tree.

The U. S. Weather Bureau has established a section of its Climate and Crop Service in Hawaii. About 40 voluntary meteorological stations have been established and equipped with instruments of standard pattern and the coöperation of a large number of Climate and Crop correspondents has been secured. The regular issue of weekly Crop Bulletins was began January 9, 1905.

DECISIONS OF U. S. BOARD ON GEOGRAPHIC NAMES

December 7, 1904

Ashnola; river, Okanogan County, Washington (and British Columbia, Canada; crosses boundary at 120° 20′) (not Na-is-nu-loh, Ashtnulon, Naisnuloh, Nais-nu-loh, Naisnutho, nor Ashanola).

Bear Lodge; mountains, Crook County, Wyoming (not Bearlodge).

Cakepoulin; creek, Franklin township, Hunterdon County, New Jersey (not Cakepaulins).

Central City; town, post-office, railroad station, and county seat, Gilpin County, Colorado (not Central).

Chewack; creek, tributary of Methow River (from the north, mouth at Winthrop), Okanogan County, Washington (not Chewuch Creek, Chewach Creek, Chewack Creek, Chiwak, Chewach, Chewuck, nor North Fork).

Conconully; lake, Okanogan County. Washington (not Salmon).

Egg; island near easternmost point of Unalaska, eastern Aleutians, Alaska (not Ugalgan nor Ugalgal).*

Ellemeham; mountain, Okanogan County, Washington (not Ellemachun, Ellomachan, nor Mt Ellemeham).

English; bay indenting the eastern shore of Unalaska Island, eastern Aleutians, Alaska (not Samganuda).*

Fraser; river, tributary from south to Grand River, post-office, and precinct, Grand County, Colorado (not Frazier nor Frazer).

Indian; creek, tributary from south to Bear Creek, Clear Creek County, Colorado (not South Fork Bear Creek, Roeder, nor Yankee).

Lake Clear; lake or pond in Harrietstown, Franklin County, New York (not Big Clear Pond nor Clear Pond).

Latah; creek, Spokane and Whitman Counties, Washington, and Kootenai County, Idaho, tributary from southeast to Spokane River at Spokane (not Hangman, Hangmans, Latah and Hangman's, Latah and Hangman, Lau-taw, nor Camas Prairie).

* Revision of previous decision.

North Head; cape, the northern point of Akutan Island, eastern Aleutians, Alaska (not Sigak) *

Old Baldy; peak in the Santa Rita Mountains, Santa Cruz County, Arizona (not Baldy, Mt Wrightson, nor Santa Rita).

Queneska; island in Shelburne town, off Shelburne Point, in Lake Champlain, Vermont (not Hog, Whites, nor White's).

Reed; post-office and railroad station, Henderson County, Kentucky (not Reads).

Rillito; creek, four miles north of Tucson, Pima County, Arizona (not Rita).

Rollins; pass, over Front Range (Continental Divide), latitude 39°56′, Boulder and Grand counties, Colorado (not Boulder nor Rogers).

Rootok; island near west end of Aratanak Island, Krenitzin group, eastern Aleutians, Alaska (not Aektok nor Rootak).*

Salmon; creek, tributary from the north to Okanogan River, Okanogan County, Washington (not Conconully, Concunully, nor White Salmon).

San Antonio; creek or river emptying into the Pacific Ocean three miles north of Purisima Point, Santa Barbara County, California (not Jesus Maria River, Guaymas River, nor Los Alamos).

Simon; pond, town of Altamont, Franklin County, New York (not Simons, Big Simon, Big Simons, Simonds, nor Big Simonds).

Sinlahekin; creek, tributary from the south to Palmer Lake, Okanogan County, Washington (not Sinlehekin, Sinlahekim, Waring-Sinlehegan, Waring, Toudes Coulé, nor Sinlahegan).

Sunset; island, Colchester town, in Lake Champlain, Vermont (not Hog Back).

Valdez; glacier, narrows, port, summit, and town, Prince William Sound, Alaska (not Valdes).*

Vance; creek, tributary from north to Bear Creek, Clear Creek County, Colorado (not Little Bear).

Whalebone; cape between Usof and Three Island bays, on south coast of Unalaska, Alaska.

January 4, 1905

Bergenfield; borough, post-office, and railroad station, Bergen County, New Jersey (not Bergenfields nor Bergen Fields).

Bruster; town and post-office on the Columbia River, Okanogan County, Washington (not Brewster).

Chiliwist; creek, tributary from the northwest to the Okanogan River, Okanogan County, Washington (not Chilliwist, Chiliwhist, Chilliwhist, nor Chilowist).

Ecorse; river, township, post-office, and railroad station, Wayne County, Michigan (not Ecorce, River aux Ecorces, nor Ecorces).

Esty; glen, north of Ithaca, New York (not Estey).

Factory; creek in Wayne and Lawrence Counties, Tennessee (not Factory's, Factor's, nor Factors).

False Bottom; creek in Lawrence and Butte Counties, South Dakota (not Falsebottom).

Indian; creek in Wayne and Hardin Counties, Tennessee (not Reinness, Reinse's, nor Reinses).

Kougarok; river tributary to the Kuzitrin River, mountain, mining district, and mining town, Seward Peninsula, Alaska (not Kugruk, Koogrock, Kougrok, Kugrock, nor Kugruk City).

Kugruk; river, flowing into Kotzebue Sound, just east of Cape Deceit, Alaska (not Swan).

Kugrupaga; river, Seward Peninsula, Alaska, flowing into the Arctic Ocean, at longitude 166° 45′ (not Kugruk nor Koogrook).

Loup Loup; creek, tributary to the Okanogan River, near Malott, Okanogan County, Washington (not Loop Loop, Loop-Loop, nor Looploop).

Palisades; township, Bergen County, New Jersey (not Palisade).

Rogers; island in Hudson River, Columbia County, New York (not Rodgers).

Wannacut; lake, Okanogan County, Washington, T. 39 N., R. 26 E. (not Waunakee, Wennacut, Wonacot, Wannacott, Wanicot, Wanacott, Wannicutt, nor Wannicut).

Weatherford; creek, Wayne County, Tennessee (not Rutherford, Rutherford's, nor Rutherfords).

February 1, 1905

Belleview; township, Washington County, Missouri (not Belview, Bellview, or Bellevue).

Chilicotal; spring and mountain, Brewster County, Texas (not Chili Corte, Chili Cortal, nor Chili Cotel).

East Branch Chenango River; stream, branch of Chenango River, in Oneida, Madison, and Chenango Counties, New York (not East Chenango River nor Chenango Creek).

Kennyetto; creek, Fulton County, New York (not Kenneto).

Mount Vernon; post-office and town, Hillsboro County, New Hampshire (not Mt Vernon nor Mont Vernon).

San Cristobal; lake, Hinsdale County, Colorado (not San Christobal, San Cristoval, nor San Cristopal).

Staser; post-office and railroad station, Vanderburg County, Indiana (not Stacer, Stacers, nor Stasers).

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* Revision of previous decision.

GEOGRAPHIC LITERATURE

Arbitration in The Hague Court. By John W. Foster. Pp. 147. Boston and New York: Houghton, Mifflin & Co. 1904. $1.00 *net.*

The efforts of President Roosevelt in advancing the interests of international arbitration make this little volume of special interest. As is expected from a man of Mr Foster's experience and ability, the merits of international arbitration are concisely and forcefully, as well as clearly, set forth. The volume covers the inception, progress, and present condition of international arbitration. It makes clear the methods and processes to be followed, concerning which there exist misunderstandings in the minds of many. The Hague Convention recognizes two classes of controversy, the first of a judicial character, and the second questions regarding the interpretation or the application of international treaties.

The Washington conference of 1890 recommended an arbitration treaty with the stipulation that the sole question which any nation is at liberty to decline to arbitrate is a question which might emperil its independence. Chile and Argentina have united in such a treaty, while the Netherlands and Denmark agreed to submit to The Hague Court all mutual differences and disputes that cannot be solved through diplomatic channels.

The Hague Court does not sit as a collective body, but the nations submitting cases for arbitration select by mutual agreement one, three, or five members from the personnel constituting the court, which in its membership is practically a permanent panel of international jurymen.

With regard to rehearings, they are to be permitted only on the discovery of new facts, previously unknown to the tribunal and the parties, which must be of such a character as to exercise a decisive influence on the judgment.

General Foster considers the much-criticised decision of the tribunal conceding preferential treatment to allied powers in the Venezuelan case, but believes with Mr MacVeagh that the presence of thirteen nations before the tribunal was such a valuable object lesson of the wisdom and efficacy of arbitration as to offset any other disadvantages.

General Foster wisely suggests that The Hague Court should be made a truly international tribunal by adding to its personnel representatives from all the American republics. He favors a prohibitive rule regarding a member of the permanent panel appearing as counsel for the litigating party, and believes that the question of expense should be carefully considered, as it is now practically prohibitive against smaller states of limited resources. There should also be suitable rules regarding the language to be used in arguments and the familiarity of the judges therewith.

General Foster shows the necessity of fostering and stimulating an intelligent interest in arbitration. It is hoped that the final outcome in the United States will be to further the interests of peace, and justify his statement that "The Hague Court will long stand as a beacon light in the tempestuous sea of international politics, and its influence and efficiency grow with advancing years."

A. W. G

Japan by the Japanese. Edited by Alfred Stead. Pp. xxvii + 697. New York: Dodd, Mead & Co. 1904. $5.00 *net.*

Mr Stead has rendered a service to all students of Japan by bringing together what might be called "the documents in the case," which are indispensable to any one desiring to obtain a correct idea of the development of that country as regards constitutional government, the growth of education, the creation of its finance system, the development of its industries, the formation of an army and navy, and its development or means of creation and establishment of a system of justice—in short, the creation of a modern and western civilization. Art and literature, the press, the merchant marine, and labor organizations all find a place in this storehouse of Japanese facts. All these articles are written by men who have taken part in this great work of transition and reconstruction, and among them are a number of international repute. Marquis Ito has written on the development of constitutional rights, the duties of political parties, and the growth of Japan; Field Marshal Yamagata on international policy and the growth of the army, the latter subject being supplemented by Field Marshal Oyama's account of the army of today. Rear Admiral Saito tells of the creation of the navy, and the Count Okuma of the foreign policy and the growth of education. Professor Imazo Nitobe contributes a most interesting chapter on the religion and moral ideas of the Japanese. Count Inouye deals with the various phases of Japanese finance, while Baron Shibusawa gives a survey of the industrial situation. Baron Suyematsu treats of the problem of the Far East, and a chapter is given to Formosa. The very brief article by Professor Maruse on women is apologetic and inadequate. Mining, labor, railways, the press, art, and literature are treated as to their development and present condition by equally competent authorities.

It must be understood that these articles are from the Japanese standpoint, and of course, as far as opinions go, are subject to refutation in many respects. The authors occasionally admit the necessity of moral improvement as well as of industrial development.

The great value of the book lies in the mass of statistical data, which are logically and sequentially arranged. The volume will long remain a work of reference, more or less standard.

There might well be added to this book a compendium volume, "Japan in the Beginning of the Twentieth Century," published by the Imperial Japanese Commission to the Louisiana Purchase Exposition, by Secretary Yamanaki, of the department of agriculture, which was printed and distributed in limited numbers. A. W. G.

Dai Nippon (Japan). By Henry Dyer. Pp. xvi + 450. Illustrated. New York: Charles Scribner's Sons. 1904. $3.50 *net*.

This is a valuable study of the evolution of modern Japan, tracing its conversion, in a single generation, from a feudality into a constitutional government, based on deliberate assemblies, national concord, individual legal rights, institution of justice, and the fostering of world-wide knowledge.

Mr Dyer's long service in Japan, beginning as first principal of the Imperial College of Engineering at Tokyo, qualifies him for this difficult study, which is commended to every investigator of Japanese affairs. The growth of educational institutions, the organization of an efficient army and navy, the establishment of railways, telegraphs, and steamship lines, the advance of industries, the growth of commerce, and the creation of a national system of finance have been accomplished so successfully in the past thirty years as to excite the attention and merit the admiration of the world. How these wonders have been wrought, their influences on art, on social conditions, and on the individual and the nation are clearly set forth.

The discussion of the oriental mind, with its preëxistent trend and its nature worship, is curious as explaining the dominant features of the Japanese—patriotism and loyalty. The chapters on international relations, foreign politics, and recent events are worthy of most careful perusal, giving as they do an insight into the causes of the present war. A. W. G.

The Land of Riddles (Russia of Today). By Dr Hugo Ganz. Translated from the German by Herman Rosenthal. Pp. vi + 331. New York: Harper and Brothers. 1904. $2.00 *net*.

This volume is not a study of Russian institutions, but a compilation of journalistic articles based on interviews with various officials and business men. Dr Ganz doubtless made the most of his opportunities in Russia, but his guesses must be received as such and not as solutions of the current complex problems—economic, military, and political—which seriously threaten the stability of Russian institutions. Labor, education, the press, military administration, methods of public business, are riddles which Dr Ganz does not consider. A. W. G.

North America. By Israel Cook Russell. Illustrated. Pp. x + 435. New York: D. Appleton and Co. 1904.

This important volume in the World Series is highly commended as not only specially worthy of study by geographical students, but also of interest to general readers. Topography and geology are admirably treated, under the head of five physiographic provinces, though with too great fullness. The chapter on climate, following text-book methods, fails to convey, to unscientific readers at least, an adequate idea of the dominant or varying weather conditions of North America, and the illustration of the ice palace, while attractive, is not in harmony with the rest of the volume.

The omission from the volume of political or economic geography is to be regretted, especially when it is considered that from these standpoints the influence of this continent has very materially modified the march of human progress throughout the entire world. The aborigines are treated most graphically and the views advanced regarding them command respect, although not always convincing. The most instructive matter is the recognition and presentation of the admirable work of Dr C. Hart Merriam, who has solved the problem of geographical life distribution, by the formulation of the life-zones and crop-zones of North America. Professor Russell writes in a clear style and logical manner, qualities not always combined, and this volume will add to his literary and scientific reputation.

A. W. G.

Fetichism in West Africa. By Robert Hamill Nassau. Pp. xvii + 389. Illustrated. New York: Charles Scribner's Sons. 1904. $2.50 *net*.

This is an important contribution to our knowledge of the religious beliefs and superstitions of the natives of French Congo and adjacent regions. It is the outgrowth of forty years of missionary work by Dr Nassau, and justifies the action of the American Board of Foreign Missions in fostering its preparation. Preëxistence, spirit power, nature adoration, and ancestor worship are the bases on which rest the universal practices in Africa of witchcraft, charms, blood-sacrifices, and other forms of fetichism. Its practical effects in depopulation, assassination by poison, and coercion are vividly described, as also the strange secret societies of various kinds which exist among the women. The folklore reveals the existence of traditions also prevalent far remote from Africa. A. W. G.

Japanese Life in Town and Country. By George William Knox. Pp. xii + 267. Illustrated. New York: G. R. Putnam's Sons. 1904.

This volume, partly a reprint of various articles, is an interesting, sketchy account of every-day life as seen during fifteen years' residence in Japan. The impressions regarding servants, merchants, trade methods, and domestic life are unattractive from a western standpoint. Contrasts of the old *samurai* (nobility) and the new are more promising. Dr Knox gives credit to Japan for choosing freedom, self-government, progress, and modern science, and forecasts its future world influence as important. A. W. G.

The Proceedings of the American Forest Congress held at Washington, D. C., January 2 to 6, under the auspices of the American Forestry Association, will be issued in book form on March 15. The volume will contain about 400 pages and will be handsomely bound in cloth. It will contain the complete addresses by President Roosevelt, Secretary Wilson, and about fifty other prominent speakers who were on the program, including not only those most prominent in State and national forest work, but the leaders in the railroad, lumbering, mining, grazing, and irrigation industries. The price of the volume is $1.25, prepaid to any address. Published for the American Forestry Association by the H. M. Suter Publishing Company, Washington, D.C.

"The Bahama Islands" will be issued as the first monograph of the Geographical Society of Baltimore early in March. The volume is illustrated with 92 plates, of which 25 are color-illustrations of vegetation, fishes, maps, charts, etc. In June, 1903, the Society equipped and sent out to the Bahama Islands a scientific expedition under the direction of Dr George B. Shattuck, of the Johns Hopkins University. Investigations were carried on in geology, paleontology, tides, earth magnetism, climate, kite-flying in the tropics for atmospheric observations, agriculture, botany, mosquitoes, fishes, reptiles, birds, mammals, medical conditions, social conditions, and the history of the islands, compiled from original records in possession of the government. The book will contain chapters on each of these subjects. The chapter on geology is written by Dr George B. Shattuck, of the Johns Hopkins University, and Dr Benjamin Le Roy Miller, of Bryn Mawr College; that on paleontology by Dr Wm. H. Dall, U. S. National Museum; that on tides by L. P. Shidy, U. S. Coast and Geodetic Survey, and so on.

BOOKS RECEIVED

Check List of Large Scale Maps Published by Foreign Governments. Compiled under the direction of Philip Lee Phillips. Pp. 58. 10 x 7 inches. Washington: Government Printing Office. 1904.

Earthquakes. By Clarence Edward Dutton, Major, U. S. A. Pp. 314. 8½ x 5¾ inches. New York: G. P. Putnam's Sons. 1904.

The United States of America. By Edwin Erle Sparks. Two vols. Pp. 385 + 385. 8 x 5¼ inches. New York: G. P. Putnam's Sons. 1904.

A. L. A. Catalog of 8,000 Volumes for a Popular Library. Editor, Melvil Dewey. Pp. 485. 9¾ x 7¼ inches. Washington: Government Printing Office. October, 1904.

Swedish Life in Town and Country. By O. G. Von Heidenstam. Pp. 286. 7½ x 5 inches. New York: G. P. Putnam's Sons. 1904. $1.20.

Historic Highways of America. Vol. 14. The Great American Canals. The Erie Canal. Vol. ii. By Archer Butler Hulbert. Pp. 224. 7¾ x 5 inches. Cleveland, Ohio: The Arthur H. Clark Co. 1904.

Students' Laboratory Manual of Physical Geography. By Albert Perry Brigham. Pp. 153. 7¾ x 5½ inches. New York: D. Appleton & Co. 1904.

Physiography. By T. H. Huxley and R. A. Gregory. Pp. 423. 7 x 4½ inches. New York: Macmillan & Co. 1904.

NATIONAL GEOGRAPHIC SOCIETY

The annual reception of the Society will be held at the home of the Society, Hubbard Memorial Hall, Saturday evening, March 11.

POPULAR MEETINGS

National Rifles' Armory, 920 G street, 8 p. m.

March 8.—"Manchuria." By Col. W. S. Schuyler, U. S. Army, who has recently returned after spending eight months with the Russian armies in Manchuria. Illustrated.

March 10.—"The Panama Canal." Rear Admiral Colby M. Chester, U. S. N., Superintendent of the U. S. Naval Observatory. Illustrated.

March 24.—"The Commercial Prize of the Orient and its Relation to the Commerce of the United States." By Hon. O. P. Austin, Chief of the Bureau of Statistics. Illustrated.

March 31.—"From Lexington to Yorktown." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

April 14.—"Fighting the Boll Weevil." By Dr L. O. Howard, Chief of the Bureau of Entomology. Illustrated.

April 28.—"Niagara Falls." By Dr G. K. Gilbert, Vice-President National Geographic Society. Illustrated.

SCIENTIFIC MEETINGS

Hubbard Memorial Hall, 8 p. m.

March 3.—General subject, "Progress in Plant Physiology." Papers by Dr George T. Moore and others on "Inoculating the Ground," "Protecting Municipal Water Supply Systems," etc.

March 17.—"Japan."

The Geography of Japan. By Mr Eki Hioki, First Secretary of the Japanese Legation.

The Fisheries of Japan. By Dr Hugh M. Smith.

Agriculture in Japan. By Mr David G. Fairchild.

April 7.—"Forestry."

Papers by Mr Gifford Pinchot, Mr Overton Price, and others, of the U. S. Bureau of Forestry, and a paper on Japanese Bamboos, by Mr David G. Fairchild.

For the benefit of the many new members of the Society the by-laws are reprinted below.

BY-LAWS OF THE NATIONAL GEOGRAPHIC SOCIETY.

ARTICLE I.—*Name.*

The name of this Society is *The National Geographic Society.*

ARTICLE II.—*Object.*

The object of the Society is the increase and diffusion of geographic knowledge.

ARTICLE III.—*Membership.*

SECTION 1. The Society shall consist of members, honorary members, fellows,* and patrons.

SEC. 2. Members shall be persons interested in geographic science.

SEC. 3. Honorary members shall be persons who have attained eminence by the promotion of geographic science. They shall not be members of the corporation, nor shall they vote or hold office.

SEC. 4. Fellows shall be persons engaged in scientific work pertaining to geography. They shall be members of the corporation.

SEC. 5. Patrons shall be persons interested in geography who have contributed one thousand dollars or more to the objects of the Society; they shall be entitled to all the privileges of membership for life.

SEC. 6. The election of members, honorary members, fellows, and patrons shall be entrusted to the Board of Managers.

ARTICLE IV.—*Officers.*

SECTION 1. The administration of the Society shall be entrusted to a Board of Managers composed of twenty-four members, eight of whom shall be elected by the Society at each annual meeting, to serve for three years, or until their successors are elected. A majority of the votes cast shall be necessary for election.

SEC. 2. The Board of Managers shall elect annually from their own number a President and a Vice-President, and shall elect annually a Treasurer and a Secretary.

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* No fellows have as yet been elected.

SEC. 3. The President shall preside at the meetings of the Society and of the Board of Managers, or may delegate this duty. The President and the Secretary shall sign all written contracts and obligations of the Society.

SEC. 4. In the absence of the President his duties shall devolve on the Vice-President.

SEC. 5. The Treasurer shall have charge of the funds of the Society, under the direction of the Board of Managers, and shall make collections and disbursements and render an annual report, and his accounts shall be audited by a committee of the Society, not members of the Board, annually and at such other times as the Board may direct.

SEC. 6. The Secretary shall record the proceedings of the Society and of the Board of Managers, conduct correspondence, and make an annual report.

SEC. 7. The Board of Managers shall fill vacancies arising in the Board.

SEC. 8. All officers shall serve until their successors are chosen.

ARTICLE VI.—*Committees.*

SECTION 1. The Board of Managers shall select annually from its own number an Executive Committee.

SEC. 2. There shall be standing committees on Publications, Communications, Admissions, Research, and Finance, whose chairmen shall be members of the Board of Managers. These committees shall be appointed immediately after the annual election of the President, to serve until their successors are designated.

SEC. 3. The committees of the Society and of the Board of Managers shall be appointed by the President except when otherwise provided. The President shall be a member *ex officio* of every committee.

ARTICLE VI.—*Finances.*

SECTION 1. The fiscal year of the Society shall begin on the first day of January.

SEC. 2. The annual dues of members shall be two dollars, payable in January.

SEC. 3. Fellows shall pay an initiation fee of ten dollars on notice of election

SEC. 4. Members or fellows may commute annual dues and acquire life membership by the payment at one time of fifty dollars.

SEC. 5. Members or fellows whose dues remain unpaid on March 1 shall be notified by the Treasurer that unless the dues are paid within one month they will be in arrears and not entitled to vote at the annual meeting, to receive the publications of the Society, or to purchase lecture tickets on members' terms. Members or fellows one year in arrears shall, after formal notification, be regarded as having withdrawn from the Society.

SEC. 6. The funds of the Society may be invested and loans may be negotiated in the interests of the Society, and any other financial business germane to the purposes of the Society may be transacted, by the Board of Managers.

ARTICLE VII.—*Meetings.*

SECTION 1. Regular meetings of the Society shall be held on alternate Fridays from November until May.

SEC. 2. Special meetings may be ordered by the Board of Managers or called by the President.

SEC. 3. The annual meeting shall be held in the District of Columbia on the second Friday in January.

SEC. 4. Twenty members or fellows shall constitute a quorum.

SEC. 5. Regular meetings of the Board of Managers shall be held on the same days as the regular meetings of the Society; special meetings may be held at the call of the President or on notice signed by five members of the Board: *Provided*, That for any of its own meetings the Board may substitute meetings of the Executive Committee.

SEC. 6. Lectures and lecture courses may be provided by the Board of Managers. Free admission to such lectures shall not be a prerogative of membership, but tickets shall be sold to members and fellows on more favorable terms than to non-members: *Provided*, That each life member who acquired life membership prior to the year 1901 shall be entitled to two admissions to each lecture and course.

ARTICLE VIII.—*Publications.*

The Society shall publish a journal or periodical under the title, *The National Geographic Magazine*, which shall be sent to all members and fellows of the Society not in arrears, and may be placed on sale.

ARTICLE IX.—*Amendments.*

These By-Laws may be amended by a two-third vote of the members present at any regular meeting, provided the proposed amendments are reported by the Board of Managers, and provided that notice thereof has been sent to all members of the Society not less than ten nor more than sixty days before the meeting. The publication of proposed amendments in The National Geographic Magazine shall be deemed a notice within the meaning of this article.

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The NATIONAL GEOGRAPHIC MAGAZINE

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VOL. XVI, No. 4 WASHINGTON APRIL, 1905

THE NATIONAL GEOGRAPHIC MAGAZINE

A REVELATION OF THE FILIPINOS

THE SURPRISING AND EXCEEDINGLY GRATIFYING CONDITION OF THEIR EDUCATION, INTELLIGENCE, AND ABILITY REVEALED BY THE FIRST CENSUS OF THE PHILIPPINE ISLANDS, AND THE UNEXPECTED MAGNITUDE OF THEIR RESOURCES AND POSSIBILITY FOR DEVELOPMENT

The following article is a summary of the report of the Census of the Philippine Islands by General J. P Sanger, Director, and Messrs Henry Gannett and Victor H. Olmstead, Assistant Directors, which is published by the United States Bureau of the Census April 8. The report makes four large handsome volumes, comprising about 3,500 pages and containing 280 illustrations and 90 maps and colored diagrams. It gives the most comprehensive and able description of the people and geography of the islands that has yet appeared. Unfortunately the edition was limited from lack of funds to 4,000 copies, which were exhausted even before publication. Through the courtesy of General J. P. Sanger, Director, the National Geographic Magazine republishes the principal results of the Census, and also a large number of the exceedingly beautiful pictures with which the report is illustrated.

THE details of the census of the Philippine Islands will undoubtedly surprise us all, for the report shows that the condition of the Filipinos is much superior from every point of view, in education, ambition, capacity, and possessions, than has been generally supposed. The census was taken in March, 1903, and is the first systematic collection of Filipino facts that has been made. As it was directed by conservative men, there can be no question that the statements reported are correct. The work was under the general supervision of General J. P. Sanger, Director, and Messrs Henry Gannett and Victor H. Olmstead, Assistant Directors, who had made such a success of the American censuses of Cuba and Porto Rico. These three gentlemen, with the coöperation of Governor Taft, have performed an achievement of which we may justly be proud. The word census in the Philippines was originally the synonym of everything repulsive, for all that it meant to the natives was a basis for more taxation. Through the tactful diplomacy of General Sanger, however, the feeling of the Filipinos was completely changed, and all of them seem to have joined in competition to see who could most help the work. But though eager to help, the Filipinos had to be trained for the work, and this required more tact and time. Then no accurate maps were to be had, so that, everything considered, the census was a most difficult undertaking, and its completion within the allotted two years reflects great credit on the Directors.

The principal object of the census, as stated in the act of Congress, was to secure statistics of population and a general knowledge of social conditions as a basis for the establishment of a Philippine Legislature, which the law directs shall convene two years after the publication of the reports of the census. This Legislature is to consist of two houses—the Philippine Commission and the Philippine Assembly.

CENSUS WAS TAKEN BY FILIPINOS

The provincial governors were appointed supervisors of the census, and under their direction the enumeration was taken. They had assembled in Manila several months before the task was begun and were there instructed as to their duties.

In the execution of the field work and the preliminary examination of the schedules 7,627 persons were engaged, and of this number 118 were Americans, 1 Japanese, 6 Chinese, and 7,502 Filipinos; so that it may be said, in all sincerity, that it was a Filipino census of the Philippine Islands. Of the 7,502 natives employed 40 were women, who fully sustained the opinion of Archbishop Nozaleda that "the Filipino women are better than the men in every way."

This was the first attempt on the part of any tropical people in modern times to make an enumeration of themselves.

The margin of error in the number of civilized Filipinos, Chinese, and other foreigners probably does not exceed a fraction of 1 per cent. It was feared that quite a large number would try to avoid the enumeration; but except in a few instances there is no evidence of such an intention. On the contrary, several remote and obscure barrios or sitios which were not found in the original lists prepared by the supervisors, and which had been overlooked, apparently, sent runners to notify the census officials that they had not been enumerated. On account of the absence of well-defined boundaries between municipalities and barrios, some apprehension was felt as to a duplicate enumeration, but this was obviated by posting a printed notice of the enumeration on every house, boat, or other place occupied as a dwelling, which was not removed until the census was at an end.

INDUSTRIES AWAITING DEVELOPMENT

Among the changes to be made will be, probably, the introduction of the American mule and the substitution of American cattle for the Indian humped cattle. That cattle-raising may become a profitable industry there is no question, as there are large areas of grazing land suitable for cattle ranches, and horses, mules, and cattle thrive in the climate of the Philippines.

Statistics show that the great agricultural wealth of the country is in the cultivation of sugar, hemp, tobacco, and coffee. Tobacco of fine quality is raised in the provinces of Cagayan and Isabela, and when carefully handled and thoroughly cured makes excellent cigars and cigarettes. The poverty of the average tobacco-grower, however, compels him to dispose of his crop before it is ready for use, and this, together with the crude methods observed in handling it, has given to Manila cigars a bad reputation among tobacco connoisseurs. When the tobacco-growers are able to hold their crops long enough and to resort to careful and scientific methods in its cultivation and preparation, the best Manila cigars will compare favorably with the best Habana cigars. No estimate can be made at this time of the productiveness of the islands in hemp, inasmuch as it grows wild as well as under cultivation, and there are many acres of wild hemp which have never been touched; moreover, the methods employed in stripping hemp are of the crudest kind. This valuable crop and its full development merely await the influence of American invention and capital.

As compared with the total area of the islands, the amount of land under cultivation is small, but it should be remembered that the islands of Mindoro, Paragua, and Mindanao, which are among the largest of the group, are very little cultivated. Again, the methods followed„ including the implements in use, are most crude, and something better must be substituted before the yield will equal the production of intelligent American farmers. Rotation in the crops, irrigation, and the use of fertilizers are almost unknown, nature receiving but little aid from artificial means.*

THE HEALTHFULNESS OF THE ISLANDS

No better illustration of the salubrity and healthfulness of the climate of the Philippine Islands could be given than that afforded by the health report of the army, both in war and peace. This shows conclusively that, under the intelligent management of our medical staff and the care bestowed on the soldiers by their regimental and company officers, men who are in good health when they arrive in the Philippines, and who observe the health rules laid down for their guidance, are, on the whole, as nearly immune from disease as within the territory of the United States. The statistics of the Surgeon General of the Army show that for the calendar year 1902 the number of soldiers constantly sick in the United States was 5.33 per cent of the command, and in 1903, 4.85 per cent; in the Philippines, for the same period, the percentage of constantly sick was 6.88 and 6.62, respectively, an average difference of 1.66 per cent.

That long exposure to the climate is enervating there can be no doubt, but the effect is easily avoided by periodical changes to a colder climate. This has been conclusively proven by the old Scotch, English, and other white residents of the islands, who, after a residence of over forty years, broken by such removals, enjoy excellent health. Formerly it was necessary to take a sea voyage in order to find relief, but with the completion of the electric railroad at Baguio, in the province of Benguet, this will no longer be needful, as the climate at that altitude will afford the requisite change.

TEACHING THE PEOPLE TO TAKE CARE OF THEIR HEALTH

Nothing that has been done by the Insular government deserves more commendation or reflects more credit on the administration than the measures taken to arrest and stamp out cholera, bubonic plague, and smallpox, to prevent the spread of leprosy, and to teach the natives how to guard against the dread diseases, tuberculosis, dysentery, and malarial fever. Only those acquainted with the native character and the insanitary conditions formerly prevailing everywhere, and particularly in Manila, can fully appreciate what has been done or that many years must pass before a majority of the native population will recognize the benefit of medical treatment and adopt sanitary rules. On the other hand, a large part of the population has already been benefited, and the experience thus gained is sure to be influential.

A serious feature in the mortality

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* See "Progress in the Philippines," pp. 116–118, NATIONAL GEOGRAPHIC MAGAZINE, March, 1905.

among the natives is the large death rate among young children, and this can hardly be charged to the climate. As is well known, a large proportion of Filipino women are unable to nurse their children. As a result, the children begin to eat solid food long before they can digest it, and cholera infantum or convulsions end their lives. It is not difficult to predict the result when babies three or four months of age are given rice, and even bananas and mangoes, as a regular diet. A propaganda among the women, having for its object their instruction in the care of infants, is necessary, and it is understood has been attempted, but as yet has not become general.

As to the other data, the conspicuous facts are the entire absence of hospitals except in a few large cities, the existence of but twelve public libraries with 4,019 volumes; the great preponderance of churches, the small number of newspapers, and the comparatively small number of paupers and criminals.

THE LABOR PROBLEM

Labor and wages are burning questions, and a great deal has been said and written to demonstrate the lazy habits of the Filipinos and the worthless character of their manual labor. These strictures usually begin and end with unfavorable comparisons between Filipinos and Chinese, Americans, or other foreign populations. There are two sides to this very interesting and important question, and through the efforts of Governor Taft, the Philippine Commission, and the army it has been made perfectly plain to unprejudiced persons that the Filipino has greater intelligence and capacity than he has been given credit for.

What the Filipinos need in order to demonstrate their capacity as laborers is a fair opportunity under reasonable conditions, not as rivals of the Chinese or other people, but of each other, as is the rule in the United States, where, if Chinamen were permitted to enter unrestrictedly into competition with American labor, the value of wages would soon reduce the average American laborer to a state of poverty. If American labor cannot compete successfully with Chinese labor, it should not be expected of Filipino labor, and the Filipino should not be judged by such a standard. The so-called aversion of the Filipino to labor is not believed to be so entirely natural and instinctive as it is the result of causes to which very little reference is usually made. The habits of centuries, although artificially acquired, may well be mistaken in any people for natural traits. Thus, the abuse of the Filipinos throughout the first two hundred years of their experience with the early colonists, the assiduous and ceaseless efforts of their teachers to humble their pride, stifle their ambition, and impress upon them the dominant race, and the utter hopelessness of any kind of equality with them have no doubt had their effect in causing indifference, shiftlessness, and recklessness.

It may be said that the Filipinos are generally subordinate to lawful authority; that, under competent officers, they make excellent soldiers, and will in the course of time, it is believed, make good citizens. In fact, it is not too much to expect that, under the guidance of a free, just, and generous government, the establishment of more rapid and frequent means of communication, whereby they can be brought into more frequent contact with each other and with the general spread of education, the tribal distinctions which now exist will gradually disappear and the Filipinos will become a numerous and homogeneous English-speaking race, exceeding in intelligence and capacity all other people of the tropics.

DOCKING IMPROVEMENTS AT MANILA

The necessity for railroads connecting the rich agricultural regions with the principal seaports is strongly emphasized by the great lack of docks and wharves throughout the islands. But few ports have docks at which an inter-island steamer can unload, and consequently every pound of freight and all passengers must be landed in small boats. One of the great drawbacks to the commerce of the Philippines has been the lack of dock facilities in the harbor of Manila for ocean-going ships. As a result, all vessels exceeding 15 feet draft must be lightered while lying at anchor some distance from the wharves and at considerable expense, more especially during the prevalence of the rainy season, when frequent typhoons interrupt the work of loading and unloading. This great obstacle to commerce will soon disappear, however, through the foresight of the Philippine Commission in making ample appropriations for the improvement of the Pasig River and the construction of an artificial harbor south of and adjoining the entrance to the river, with wharves capable of receiving and discharging at all seasons the largest sea-going vessels.

These improvements, which are to be completed by June 30, 1905, at a cost of about $4,000,000, will make Manila one of the great ports of the orient. Direct trade with the United States will then be the rule and not, as in the past, the exception. Manila will become a great mercantile depot and point of distribution of American and foreign merchandise of all kinds, destined for either the Philippines, China, or other points. The development of the abundant coal deposits in the Philippines, with the harbor improvements above referred to, will make Manila the chief coaling port in the East, surpassing Nagasaki in this respect, for the coal is of a quality equal to that of Japan and the coaling facilities of Manila will be much superior to those of the Japanese city. The commercial importance of Manila will become still more apparent when the Panama Canal is completed.

USE OF LIQUOR AND TOBACCO

The value of manufactured tobacco far exceeds any other industrial product, liquors and other beverages come next, and the two combined make 38.5 per cent of the value of all manufactured products. It should not be inferred from this that the Filipinos use these articles in excess, or that intemperance prevails, for, while nearly the entire population use liquor and tobacco in some form, they do so in great moderation. That the state of manufactures in the Philippines is what it is should occasion no surprise when we review the colonial system of government which generally prevailed for so many centuries. Under this system the Filipinos received but little encouragement to engage in industrial pursuits, and manufactures were not developed. The capital invested in manufactures exceeds $20,000,000.

IMPROVEMENTS IN THE LAW COURTS

Many important and salutary changes have been made by the Insular government. Stenographers and typewriters have been substituted for longhand writers in the courts. The Spanish colonial judiciary as it existed in the Philippines at the time of American occupation has been transformed into a system under which, says Chief Justice C. S. Arellano in the chapter on "The Judiciary," "we have a more simple code of civil and criminal procedure, following American methods, and an avoidance of the great delays which previously existed in the disposal of cases and criminals. In fact, delay is now more a question of a sufficient number of judges than, as formerly, of voluminous and abstruse forms and of petty interlocutory appeals or other means of obstructing and arresting the course of justice."

The successive steps taken in changing the judicial system are of great interest, and illustrate in a conspicuous manner the adaptability of American legal institutions to the greatest of our new possessions.

Until January 1, 1906, Spanish will be the official language of all the courts, and after that English; meanwhile the supreme court and courts of first instance may in any case order a duplicate record of a case in the English language whenever, in the opinion of the court, the public convenience and the interest of the litigant parties will be promoted thereby. This is a fortunate settlement of a difficult question, and is equally fair to the English and Spanish speaking lawyers, besides preventing the resentment which would have followed had English been forcibly imposed on the people by operation of law.

EXPLORATION IS IN PROGRESS

Although Spain had jurisdiction over these islands for more than three centuries, little topographic information had been acquired regarding them, except such as was of a very general character. The coasts were badly mapped and in many places are now known to have been miles out of position. The coast charts, made from Spanish surveys, are so inaccurate as to be, on the whole, worse than useless to mariners, while of the interior of the larger islands little was known except what could be seen from the sea. Many maps of the archipelago have been published embodying the knowledge which had been acquired both during the days of the Spanish jurisdiction and in more recent times, but they are all very much of the same character.

Since American occupation much exploration and surveying have been done. Wherever military operations have extended, surveys have been made and maps prepared. In this way there have been produced maps covering a large part of Luzon, including the entire central portion of that island. Maps have been made of several of the Visayan Islands. The operations against the Malanao Moros have resulted in a map of Lake Lanao and its surroundings in Mindanao. The island of Jolo has been mapped.

The great work of charting the coasts and harbors of the Philippines was commenced three years ago by the United States Coast and Geodetic Survey, working in coöperation with the Philippine government, and progress is being made in the preparation of accurate and trustworthy charts of these dangerous coasts.

THE ISLANDS ARE OF VOLCANIC ORIGIN

The entire archipelago is mountainous or hilly. In the islands of Luzon, Negros, and Mindanao are broad plains and level valleys, but in general there is comparatively little level land. Tropic vegetation extends high up on the slopes and covers the lesser mountains and hills. Thus the ruggedness of a mountain region is softened into rounded outlines. The mountain scenery is everywhere beautiful, but rarely appeals to the eye with the element of grandeur.

The archipelago is, for the most part, of volcanic origin. It contains twelve volcanoes which have been in eruption within historic times, and scores which are extinct or quiescent. Most of the surface of the islands is floored with volcanic rocks and ash. In northern Luzon there are, however, large areas underlain by metamorphic rocks, granites, schists, and the like; and several islands, notably Cebu and Bohol, are covered with a veneer of coral limestone. The occurrence of these coral limestones of very recent disposition, at various places in the archipelago and at great altitudes, as in Benguet province at a height above sea of 5,000 feet, shows that great oscillations of level have occurred at times geologically very recent. Of these oscillations there are other abundant evidences in the existence of lakes and marshes, waterfalls, and elevated beach lines, showing that the whole archipelago is in a condition of unrest.

THE COASTLINE IS GREATER THAN THAT OF THE UNITED STATES

The coasts of the archipelago are for the most part intricate ; how intricate may be realized from the statement that these islands, with an area of about 115,000 square miles, have a coast line more than double the length of that of the main body of the United States. They are in part the result of volcanic action and in part the work of coral animals. Vulcanism has brought up the land from great depths in the form of thousands of large and small islands, fringed with coral reefs, some of which have been brought to the surface, while others lie immediately below it.

With such a broken coast, harbors of one sort or another are numerous. Most of them are of sufficient depth to admit large vessels, but are so difficult and dangerous of entrance, owing to the reefs which obstruct them and to the absence of lights, channel buoys, range stakes, and accurate charts, as to be of little value except to those who know them well. Owing to the alternating character of the winds which prevail throughout most of the archipelago, the northeast trade wind from October to June and the southwest wind during the rest of the year, many, if not most, of the harbors furnish shelter during only a part of the year.

All the principal islands and groups of islands have harbors for the largest vessels in all kinds of weather at all seasons, except the island of Bohol, which has no harbors, and there are many harbors which are safe only according to the season of the year.

THE EQUATORIAL CURRENT, TIDES, AND RIVERS

The dominating feature of the currents in the islands is the great equatorial current, which, sweeping across the Pacific from east to west in a broad belt, divides east of these islands. The northern portion, which farther north is known as the Japan current, sends numerous streams through the passages among the islands, thus forming a complicated system of currents almost impossible of description. The system is still further complicated by surface drifts, set in motion by the southwest wind in the summer and fall, making currents in various directions among the islands at different times of the year.

Tides in the archipelago are exceedingly irregular, differing greatly in different places, owing to the directions in which tidal waves move, and differing also greatly at different times of the month. For details regarding them reference should be made to the sailing directions prepared by the United States Coast and Geodetic Survey.

There are few rivers in the Philippine Islands, the Cagayan of northern Luzon, the Rio Grande de Mindanao, and the Augusan of Mindanao being the only three which can be classed as large streams. These, which are in approximately the same class, have a length exceeding 200 miles, and owing to the abundance of precipitation carry large volumes of water even during the low stage. The Pampanga River of central Luzon is nearly as large, and this is followed in magnitude by the Ango of central Luzon and the Arbra in the northern part of the same island. Probably there are no other streams in the islands which exceed 100 miles in length.

3,141 ISLANDS

Mr G. R. Putnam, in charge of the United States Coast and Geodetic Survey in the Philippine Islands, at the instance of the Director of the Census, made a count and measurement of all the islands and islets comprised in this archipelago, including everything, however small, which at high tide appeared as a separate island. The total number thus enumerated by him was 3,141, and are listed in tables; of these 1,668 were listed by name, while 1,473 are, so far as known, without names. The number found is nearly twice as great as heretofore known; as more accurate charts of the archipelago are made, it is believed the number will be increased.

AREA OF THE ISLANDS

The total area of the islands is 115,026 square miles. There are two islands with areas exceeding 10,000 square miles each, namely, Luzon with 40,969 and Mindanao with 36,292. There are 9 islands each of which has an area of more than 1,000 square miles and less than 10,000. There are 20 between 100 and 1,000 square miles, 73 between 10 and 100 square miles, and 262 between 1 and 10 square miles. The remaining number, 2,775, or seven-eighths of all, have areas less than a square mile each.

VERY FEW MAMMALIA

The fauna most closely resembles that of the neighboring Malayan Islands, but at the same time shows certain remarkable differences from them. Thus there are very few mammalia in comparison with the number in Borneo and Java. There are but two species of monkeys, but three representatives of the carnivora, and of the deer tribe but six species. Small rodents are very scarce except in the large seaports, while, on the other hand, there are at least 30 species of bats. There are no large mammalia except the carabao, a few of which are still found wild, and the timarau or antelope buffalo of Mindoro. Altogether there are but 23 species of terrestrial mammals known on the islands.

Not only does the fauna of the Philippine Islands differ in certain marked respects from that of the adjacent islands of the East India archipelago, but the different islands of the Philippines differ among themselves in their fauna. The timarau is found only in Mindoro, porcupines are found only in Paragua and in the Calamianes Islands, and there are numerous species of animals which have been found only in certain parts of the archipelago.

GREAT VARIETY OF BIRDS

Such peculiarities of distribution of land animals may be explained easily, but it is not so easy to explain similar facts concerning the distribution of birds. Paragua and the Calamianes Islands possess several species which are not found elsewhere in the archipelago, but which are similar to species found in Borneo. Of the 286 species of birds found in Luzon 51 at least are not known to occur outside of that island. The avifauna of Samar and Leyte contains 22 species not found elsewhere, and similarly in Mindanao and Basilan are found 17 species peculiar to those islands. One of the most striking cases, however, is that of Cebu, which, although a near neighbor to Negros on one side and Bohol on the other, contains 9 species of birds not found elsewhere. The total number of species of land birds known is a little over 300, a larger number than in Java; of these many are game birds, such as snipe, plover, quail, duck, and geese. In spite of this richness of species there are many important genera found in the other Malay Islands which are not represented here, while on the other hand more than two-thirds of the Philippine species are peculiar to that group of islands. These facts strongly emphasize the isolation of the archipelago.

THE FORESTS

The forests of the archipelago are of wide extent and embrace a great variety of woods, many of them highly valuable. Woods suitable for the finest cabinetwork, for veneering, and for artistic purposes, and also woods adapted to ship or house building and other economic uses, are found in great abundance. There are also many gutta-percha, India-rubber, and other gum-producing trees, dye and medicinal woods and plants, and other forest growths, most of which are mentioned in connection with the subject of agriculture. The enormous extent and wide range of usefulness of Philippine forest products will render them, under the careful management and conservation provided for by law, second only to agricultural products as a source of insular wealth and prosperity.

The number of different kinds of trees is not known, but the report of the chief of the Philippine Forestry Bureau for 1902 shows that 747 species of wood were brought to the market during the year ending June 30, 1902. The number of useful woods is undoubtedly larger than the number marketed, and in addition the forests contain many trees the woods of which are not used for domestic or economic purposes.

Summarizing the information at hand, it appears that approximately 70 per cent of the area of the archipelago, or 80,000 square miles, is forested. The forested area was estimated by Fernando Castro in 1890 at about 48,112,920 acres, or 75,150 square miles. This estimate includes all the woodland, public and private, and amounts to 66 per cent of the total area. An official estimate made in 1876 gave an area of about 80,000 square miles.

WEALTH OF TIMBER

Little is known concerning the stand of timber per acre. The Forestry Bureau has made careful examinations at several places in the islands and has measured sample acres containing more than 10,000 cubic feet, or 100,000 board feet, per acre, and it reports large areas of virgin forest, of which the average stand is 7,000 cubic feet per acre. It is probable, however, that this is much above the average of the wooded area of the islands; still enough is known to hazard the conjecture that the average stand of timber in the islands may exceed 2,000 cubic feet per acre.

If this estimate of average stand is not excessive, the amount of timber in the archipelago is in the neighborhood of 1,000,000 million feet B. M., or more than double the amount in the States of Oregon and Washington together.

The stumpage value of the above timber to the government, at an average of three cents gold per cubic foot, is not far from three billion dollars, and it is easy to foresee that when the lumber industry reaches any considerable magnitude the receipts from it will form no inconsiderable part of the income of the government.

The islands are well supplied with streams having sufficient volume of water for floating logs. Most of these can be made good driving streams by a little work in the way of removing snags and sand bars. It must be remembered, however, that most of the timber in the Philippines is too heavy to float, and that the logs must be buoyed by bamboo poles. It may be discovered, when logging operations on a large scale are instituted, that logging railways will be more economical than driving the logs in the streams.

Logging is carried on at present on a small scale and with very primitive appliances. The logs are dragged out of the woods by carabaos to the railroad or to the streams, down which they are floated by the aid of the bamboo.

EXCELLENT COAL IN ABUNDANCE

Unless all indications are deceptive, the mineral wealth of the Philippine Islands is very great. Coal, of Tertiary age, of widely differing qualities, from lignite so soft and impure as to be practically worthless up to that equal in steam capacity to the best Japanese coal, is found scattered widely over the archipelago. Indeed, there are few provinces in which it has not been found. Many of the prospects which on the surface appear almost worthless, owing to weathering, may, with depth, develop into a better quality. Gold also is very widely distributed, but thus far the veins and placers are poor and cannot be worked at a profit under present conditions of transportation and labor. Valuable deposits of copper and iron have been discovered, and in years past have been worked to a limited extent. Indications of asphaltum and petroleum have also been discovered, yet the mineral production of the islands was in 1903 practically nothing.

Coal is now being mined on Batan Island by the United States, which has leased a tract of coal land, for the supply of the army transports. Analyses show that it equals the best Japanese coal. Some is also mined by private parties.

It is altogether probable that in the near future the Philippine Islands will produce not only enough coal for their own supply, but may furnish coal for a large part of the commerce of the Pacific—a fact of prime importance in determining the course of that commerce.

Gold has been mined for centuries by the Igorots in Lepanto-Bontoc and Benguet, both from veins and placers. The total output has been small, as both classes of deposit are of low grade, but the Igorot is contented with low wages, especially if he is working for himself. Since American occupation this mountain range has been prospected by Americans and several hundred claims have been located. Little work has been done on them, and it is not believed that any deposits likely to prove profitable under present conditions of labor and transportation have been discovered.

APPARENTLY THE ISLANDS HAVE ENOUGH GOOD IRON ORES TO BUILD UP EXTENSIVE MANUFACTORIES

The deposit of iron ore in Angat and neighboring parts of Bulacan province appears to be extensive and rich. The ore is hematite and magnetite, principally the latter, and runs from 50 per cent to 63 per cent of metallic iron. The deposits extend over a belt 40 miles in length, varying greatly in breadth, lying on the west slope of the range which forms the eastern portion of the province. The ore was mined to a small extent during the Spanish domination, but without financial success. Little prospecting of the deposits in place has been made, the ore having been taken mainly from boulders on the surface. It was smelted with charcoal in small, crude blast furnaces.

This property has been examined and reported on by the mining bureau of the Insular government, and it appears probable that it may be made of great value to the archipelago, not only rendering it independent of the rest of the world in matter of pig iron, but it may build up extensive manufactories of iron and steel in these islands.

AGRICULTURAL PRODUCTS

The most important commercial product of the islands is abacá, or Manila hemp. This is indigenous to all provinces, but the fiber is unlike the hemp of other tropical countries, and is found only in the Philippine Islands. The value of the exportations of this product exceeded nineteen millions of dollars in 1902, or was two-thirds of the value of all exports. Nearly all of this material is shipped in the raw state to Europe and America for manufacture into cordage. Although a large area was devoted to the cultivation of hemp, much of the product that was exported was gathered wild.

The exportation of the dried kernel of the cocoanut, known as copra, is steadily increasing, and promises to become of great commercial importance. The value of the exports of copra and cocoanuts for 1902 was $2,701,783. The cocoanut palm flourishes luxuriously in the Philippines, and when its products are systematically harvested it is a source of unfailing revenue and profit, supplying several by-products of commercial value.

The demand for rice throughout the archipelago far exceeds the domestic supply, and it will probably be necessary to continue to import it indefinitely, as the cultivation of hemp and other products is much more profitable. It is probable that the cultivation of cacao, from which the chocolate is derived, is likely to greatly increase and become one of the principal producing products of the islands, as the cacao of the Philippine Islands is superior to that grown anywhere else in the world.

THE POPULATION

The total population of the Philippine archipelago on March 2, 1903, was 7,635,426. Of this number 6,987,686 enjoyed a considerable degree of civilization, while the remainder, 647,740, consisted of wild people. There were 14,271 white, 8,135 being Americans and 42,097 yellow, of whom 921 were Japanese and 41,035 Chinese.

Of the eight civilized tribes the largest is that of the Visayans, who occupy most of the Islands lying between Luzon and Mindanao, and form nearly one-half of the entire civilized population. Tagalogs occupy the provinces in the vicinity of Manila. They rank second, with a little more than one-fifth of the civilized people, and the Ilocanos rank third, with approximately one-eighth.

The civilized people, with the exception of those of foreign birth, were practically all adherents of the Catholic church, while of the peoples here classified as wild a large proportion, probably more than two-fifths, were Mohammedans in religion and were well known in the islands as Moros. The remaining three-fifths belonged to various tribes, differing from one another in degrees of barbarism. With the exception of the Negritos and the people of foreign birth, all the inhabitants of these islands are believed to be Malays.

The people of the Malay race constitute most of the inhabitants of the Malay peninsula, Java, Sumatra, Borneo, Celebes, and other associated islands, together with the Philippines. The total number of Malays is somewhere in the neighborhood of 40,000,000, of which over 28,000,000, or three-fourths, are found in Java, most of the remainder being in the Philippine Islands.

INCREASE IN POPULATION RAPID

At the beginning of the century Java had a little more than double the population of the Philippine archipelago. At the end of the century it had four times as many people.

The cause of this is not easy to determine So far as known, the people of Java have been quite as subject to epidemics and diseases as the people of the Philippines, and there is no apparent reason for the more rapid growth.

The average annual rate of increase of the Philippines in the last half century has exceeded that of all the countries of the world, with the exception of the United States, Russia, and Japan, and has equaled that of Denmark. It was nearly three times as large as that of British India and Spain, nearly six times as large as that of France, and yet it was less than half as great as that of the United States.

SURPRISING ABILITY TO READ AND WRITE

Literacy among the people of the Philippines means the ability to read and write in any language—English, Spanish, or a Malay tongue. Since, in all probability, less than 10 per cent of the people of the islands can speak Spanish or English, the fact is unquestionable that the majority of the people reported as literate can read and write only the native tongues. This is a result of the policy of the friars, who, from motives of their own, discouraged the learning of Spanish by the natives in order that they might act as intermediaries between the people and the civil authorities, and thus retain their influence over their charges.

A little less than one-third of the Filipino males of voting age are able to read and write.

There were 1,161,925 males who were able to read, constituting 47 per cent of all males 10 years of age and over. In other words, nearly one-half of the males could read. The number of females able to read was 1,049,509, or 42 per cent of all the females 10 years of age and over, a proportion considerably less than of males. Of all those who could read, males constituted 52.5 per cent and females 47.5 per cent.

The number of males who could both read and write was 735,564, or 29.8 per cent of the male population 10 years of age and over. The number of females who could both read and write was only a little more than one third as great, being 267,024, or only 10.7 per cent of the females 10 years of age and over.

From the above it appears that, while nearly two-thirds of the males who were taught to read were taught to write, only about one-fourth of the females received an equal degree of education. Far less attention evidently has been paid to the education of women in the Philippines than to that of men. In the United States, Cuba, and Porto Rico literacy, by which is meant the ability to both read and write, was somewhat lower among females than among males—that is, a slightly larger proportion of those who were taught to read were also taught to write among males than among females—but the proportion there was only a fraction of that which prevailed in the Philippines.

The number of males reported as having received superior education was 59,020, or 2.4 per cent of those 10 years of age and over, and of the females 17,607, or seven-tenths of 1 per cent. Education among males was thus nearly three and a half times as great as among females.

The most literate tribe of the provinces is the Pampangan, 48.4 per cent of whose males of voting age were able to read and write. Next to the Pampangans are the Tagalogs, with 43.1 per cent, while the lowest are the Visayans, with only 32.2 per cent. Measured by the proportion having superior education, the Tagalogs are easily first, followed by the Pangasinanes and Zambalans, while the Visayans are still at the foot of the column.

THE FILIPINO IS AMBITIOUS TO LEARN

According to Hon. W. H. Taft, Secretary of War and formerly Governor of the Philippine Islands, the "90 per cent of the Christian Filipinos who do not speak Spanish are really Christians. They are capable of education, and they have no caste or arbitrary customs which prevent their development along the lines of Christian civilization. They are merely in a state of Christian pupilage; they are imitative; they are glad to be educated, glad to study some language other than their own, and glad to follow European and American ideals. They differ utterly in these respects from the East Indians, from the Malays of Java, and the Malays of the Straits Settlements, and thus make our problem different from and vastly easier than that of England and Holland."

EDUCATION IN THE PHILIPPINES

At the date of the census there were 2,962 schools in the archipelago, an average of three for each municipality. Of these, 55 per cent were public, about 33 per cent were private, and the remainder were under the control of the Roman Catholic Church. Of the total enrollment 6 per cent were reported for the primary schools. There are but two institutions devoted to higher education.

Five per cent of the civilized population of the Philippine Islands are enrolled in the schools. This proportion is only a little over one-fourth of that for the United States, but it represents practically a two years' growth, as the school system may be said to have commenced with American occupation. One-sixth of all children of school age are enrolled, and three-fourths of that number are in the public schools. The attendance is 62.5 per cent of the enrollment as compared with 70 per cent in the United States. Boys constitute three-fifths of the pupils in the Philippines, while in the United States the schools are almost equally divided as to sex. Six thousand teachers are employed, four-fifths of whom are Filipinos, receiving an average annual salary of $125.02. The average public-school teacher has charge of 73 pupils, while in the United States the number is 36. Of the 3,461 school buildings, the majority of which are public, approximately one-third are built of durable materials. There is great need of additional school facilities and better buildings and equipment, and there is a general demand for an increase in the number of American teachers.

THE USE OF ENGLISH IN THE SCHOOLS

Although the study of English has met with some opposition, this opposition is diminishing. Eleven per cent of the pupils throughout the archipelago are reported as understanding the language, and this may be regarded as very satisfactory progress for the short space of two years. In Manila there are 21 night schools, with an enrollment of more than 4,000 adults, who are engaged in acquiring the English language. During the fiscal year ending June 30, 1903, about $1,500,000 were expended for educational purposes.*

DENSITY OF POPULATION

The density of population of the islands, as a whole, was 67 per square mile; that of Java was not less than 553, or more than eight times as great; that of the main body of the United States was 26, and that of the State of Indiana, which most nearly approached that of the Philippines, was 70 per square mile.

The most densely populated of the provinces, Ilocos Sur (on the west central coast of Luzon), had 398 inhabitants to a square mile. This was slightly exceeded by Rhode Island among the States, with 407, but in turn it exceeded Massachusetts, the second most densely populated, which had 349. Near this state in density were Cebu, with 337, and Pangasinan, with 334, to a square mile. These three were the only provinces with more than 300 inhabitants to a square mile.

Luzon is the largest island, with an area of more than 35 per cent of the whole archipelago and a population almost exactly one-half that of all. Mindanao, the second in rank, has an area of 31 per cent of that of the archipelago, while its population was only 7 per cent. These two islands together contain two-thirds of the area and 56 per cent of all the people.

As a rule, the density increases as the size of the island diminishes. This is due to the fact that the population in large part is a seaboard population, no less than 65 per cent of it living in municipalities bordering on the coast. Perhaps a fairer measure of the density of the population throughout a large part of the archipelago at least would be to divide the population by the length of the coast line. Nearly two-thirds of the Christian population, 65 per cent, live on or near the seacoast, and 35 per cent live inland.

THE PEOPLE LIVE IN VILLAGES

There are in the Philippine Islands about 13,400 barrios, which may be regarded as the equivalent of villages. The average size of a barrio or village in the Philippine Islands is 500 people.

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* See "Educating the Filipinos." NATIONAL GEOGRAPHIC MAGAZINE, January, 1905, pp. 46–49.

CHARACTER OF THE HOUSES

The streets, as a rule, are not paved, and the roads generally are in poor condition, especially in the rainy season. For potable water, except in Manila, reliance is placed on wells and cisterns, and very little attention has ever been paid to sanitation. The houses of people of means are built of stone, brick, or wood, and their homes are provided with all available comforts. But it is safe to say that nine-tenths of the houses in the Philippines are built of bamboo, thatched with nipa, cogon, or other grasses, and are admirably adapted to the climate and to the condition of the occupants.

Owing to their long subjugation to friar and civil power, all parts of the islands have received a similar grade of culture. A town in the Cagayan Valley presents the same style of architecture, the same surrounding barrios, has the same kind of stores and similarly dressed people as a Christian municipality on the Island of Mindanao. In spite, however, of these facts the population has remained separated into practically the original tribes or groups, each speaking a different idiom and feeling strongly its separateness from the other.

THE TRIBES DO NOT MIX WITH EACH OTHER

An examination of the map showing the distribution of the tribes or peoples of the Philippine Islands shows that, generally speaking, the various tribes have kept very closely to themselves. To show how closely, it may be said that, after eliminating from consideration the municipalities in the provinces of Benguet and Lepanto-Bontoc and those of the comandancias, in 179 municipalities every male 21 years and over was of one Christian tribe, while 94 towns contained only one person different from the prevailing tribe. In 620 municipalities, or nearly two-thirds of all, at least 99 per cent of the men were of one tribe, and in 820 at least 90 per cent were of one tribe.

There is one tribe, and one only, which seems to possess a migratory, colonizing disposition; that is the Ilocano, and even they, whenever they have invaded the territory of other tribes, have mixed with them very little, forming villages by themselves.

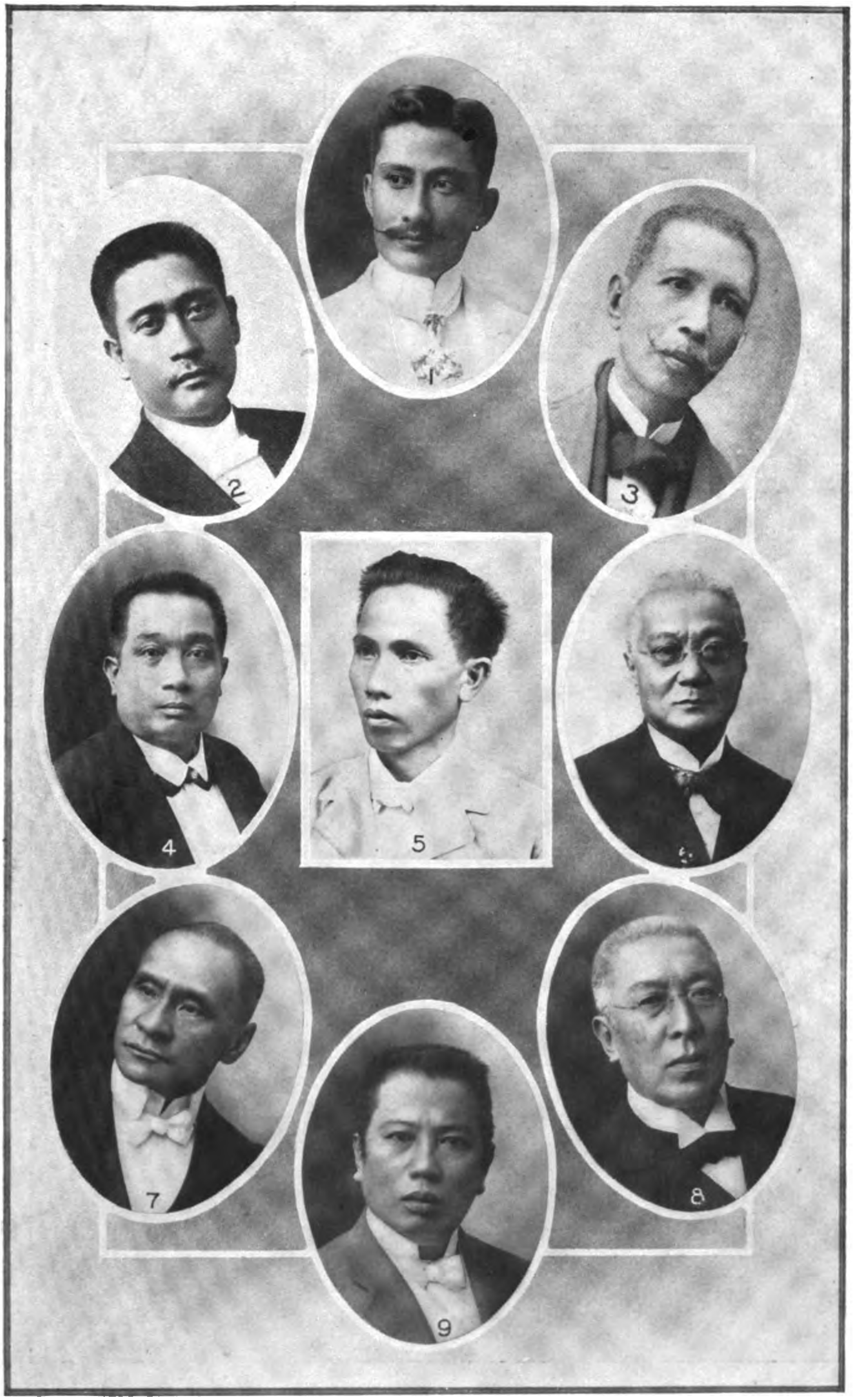
THE AVERAGE AGE OF THE FILIPINO

Of the total native population of 6,931,548, 3,443,816 were males and 3,487,732 were females, the proportions between the sexes being 49.7 per cent males and 50.3 per cent females.

The average age of the people of the Philippine Islands is 23.9 years. This is 2.4 years less than the average age of the people of the United States, which is 26.3 years, and is greater than that of the negroes in the United States, 23.2 years. The average age of the brown people in the Philippines was 23.8 years, a trifle less than that of the total population. The average age of the Chinese was 33.4 years, much less than that of the same people in the United States, which was 40 years. The average age of the white people in the Philippines was 30.3 years.

THE FILIPINO FAMILY

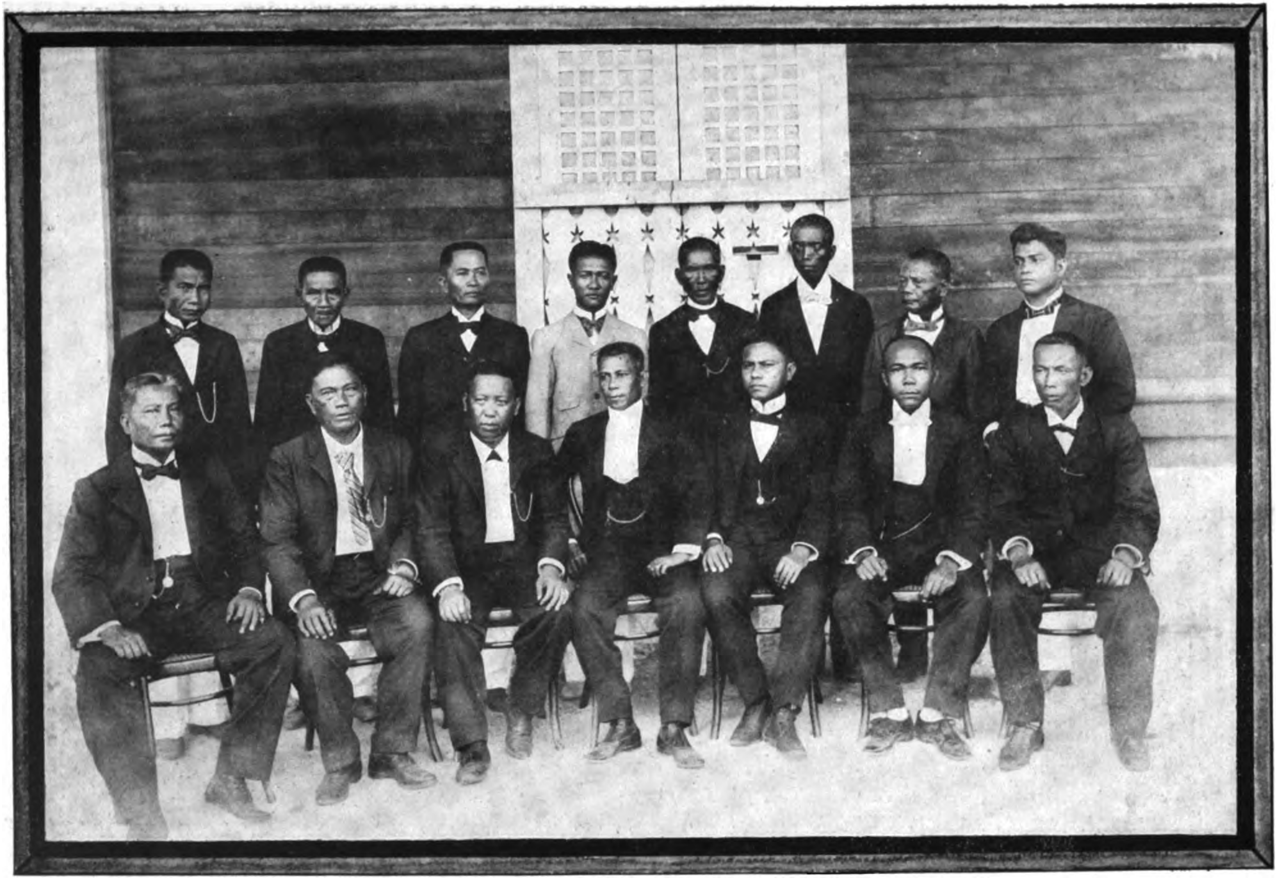
Although the Filipino families have been diminished in size by insurrections and cholera, the average family consists of 4.7 persons, and this is still about equal to that of the United States. The largest families are found among the Cagayan and Visayan tribes, and the smallest among the Ilocanos. About one-sixth of the population is comprised in families of 5 members. Families of 8, 9, and 10 persons form in each case a smaller proportion of the population than do families of similar size in the United States, Porto Rico, and Cuba;



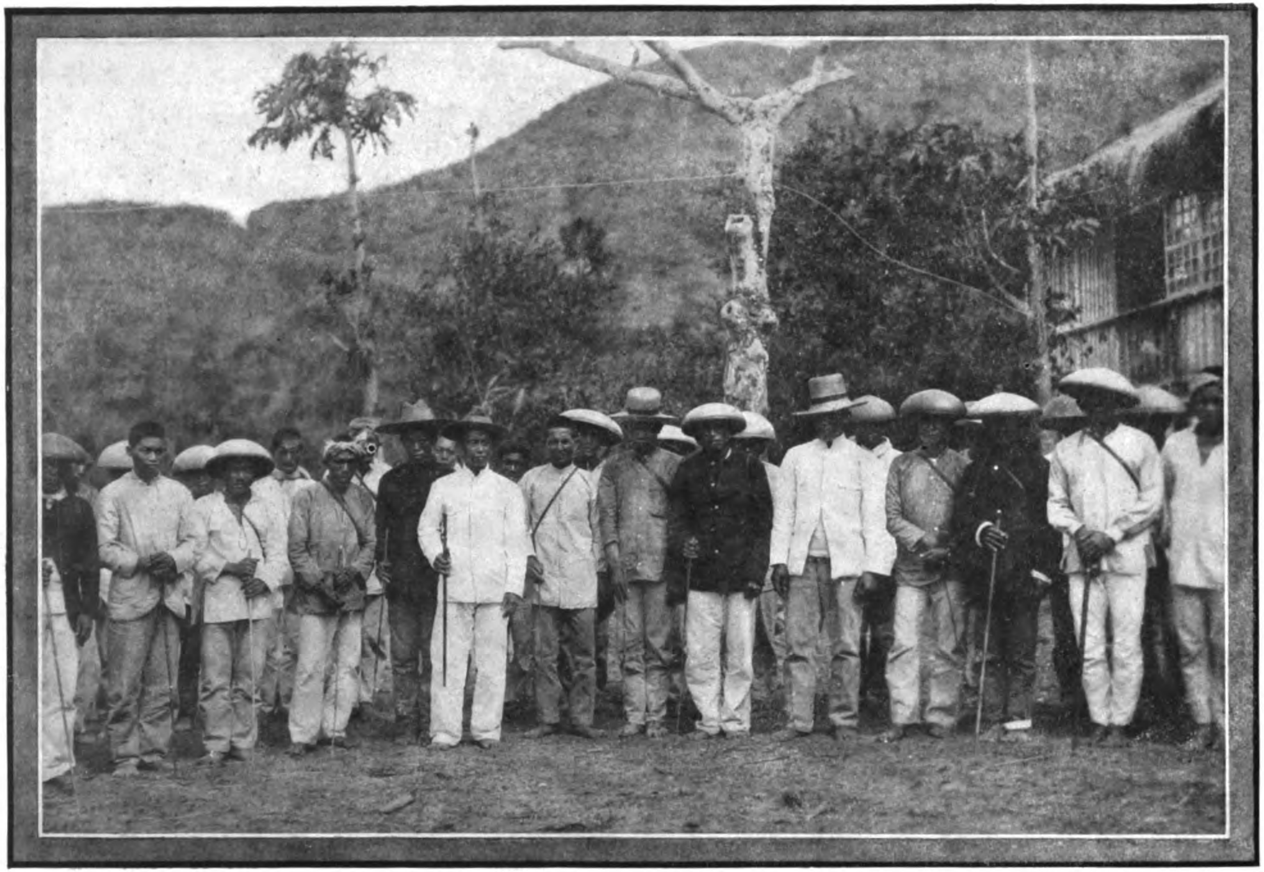
SOME SUPERVISORS OF THE CENSUS.

1. Gov. Potenciano Lesaca, Province of Zambales (Zambalan).
2. Gov. Francisco Dichoso, Province of Isabela (Cagayán).
3. Gov. Grazio Gonzaga, Province of Cagayán (Cagayán).
4. Gov. Julio Agcaoili, Province of Ilocos Norte (Ilocano).
5. Gov. Juan Villamor, Province of Abra (Ilocano).
6. Gov. Mena Crisologo, Province of Ilocos Sur (Ilocano).
7. Gov. Ceferino Joven, Province of Pampanga (Pampangan)
8. Gov. Macario Fávila, Province of Pangasinán (Pangasinán).
9. Gov. Bernardino Monreal, Province of Sorsogón (Bicol).

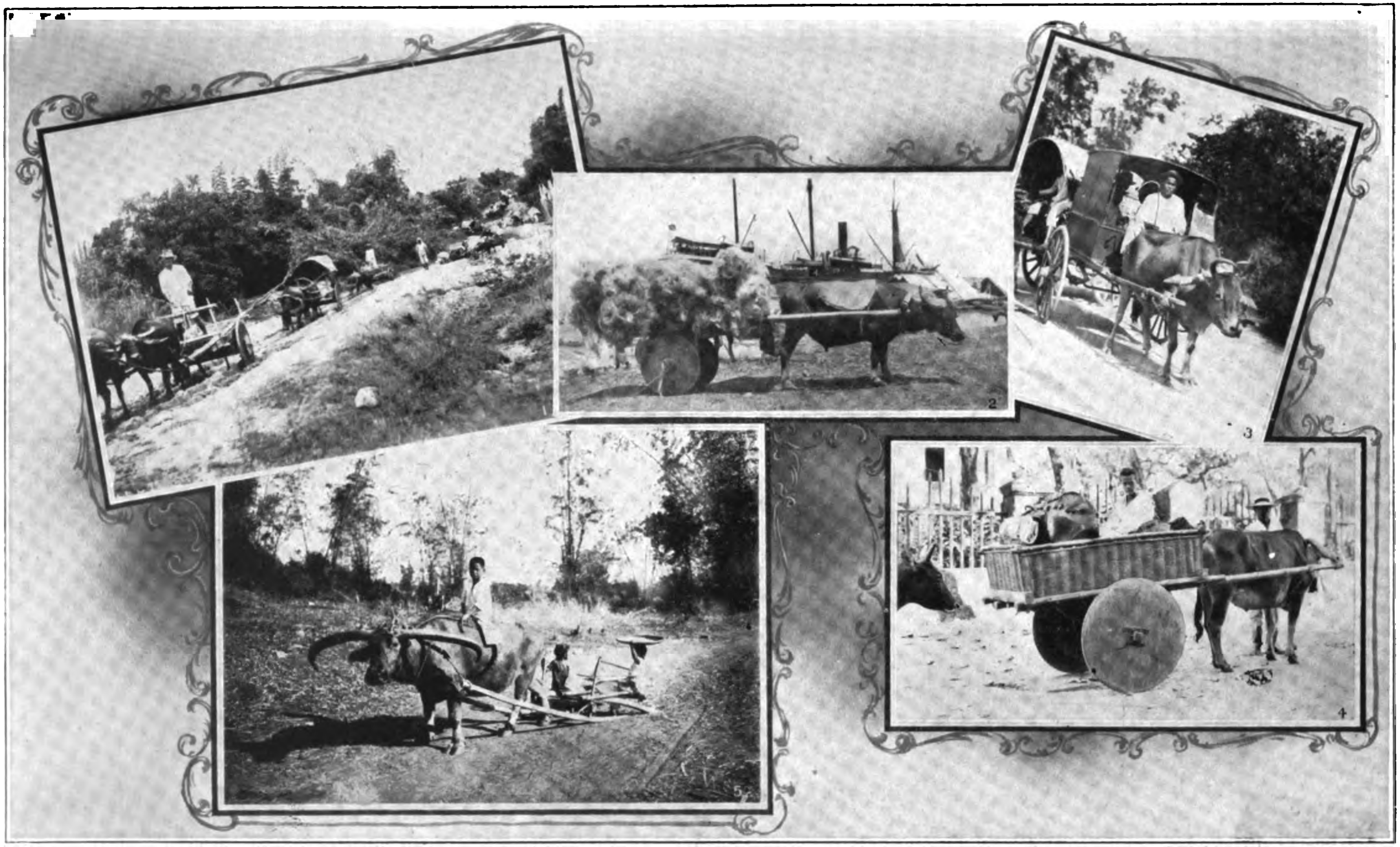
GOV-SUPERVISOR ORTEGA AND PRESIDENTES, PROVINCE OF LA UNIÓN (ILOCANOS).



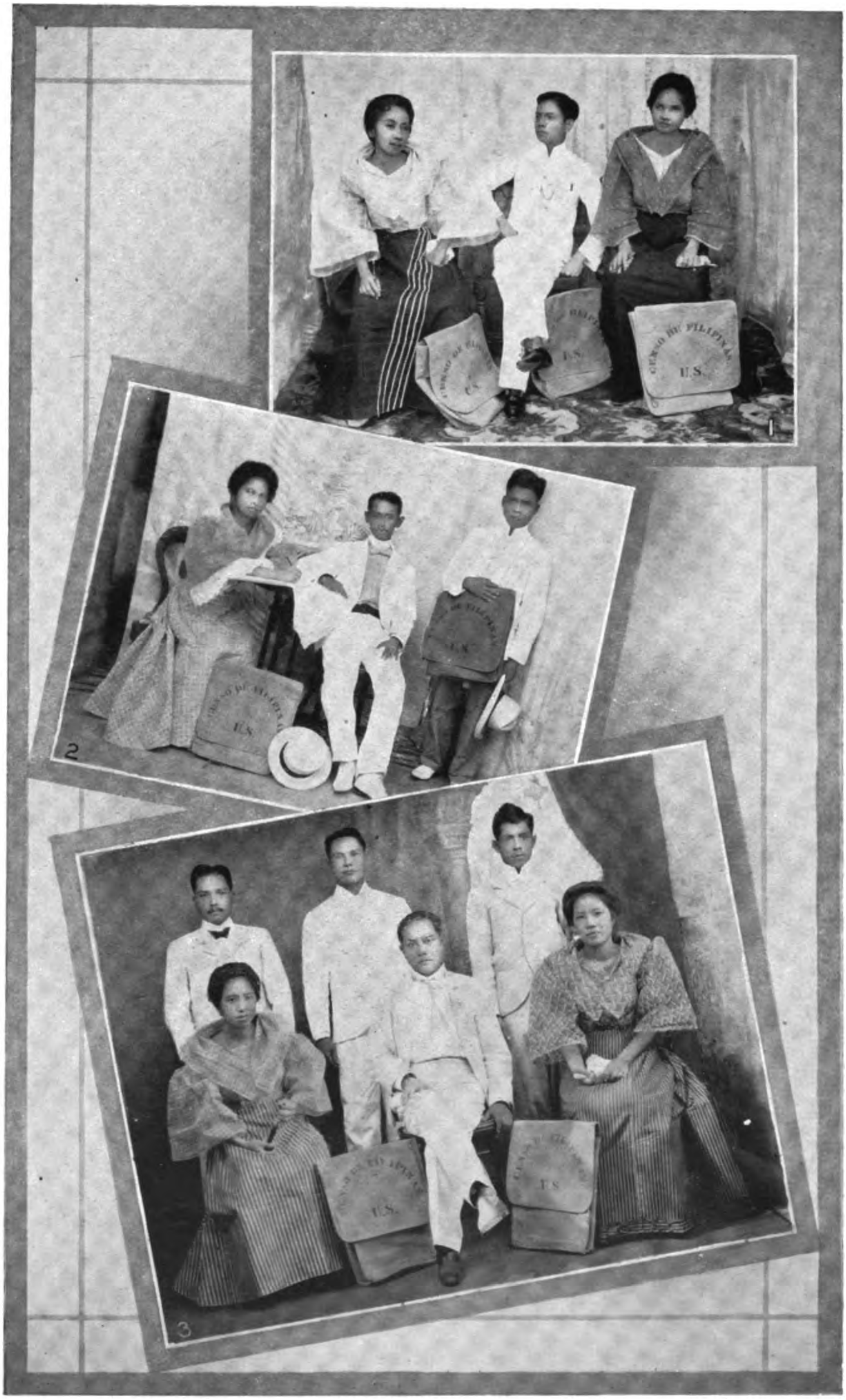
GOV-SUPERVISOR RAMOS AND PRESIDENTES, PROVINCE OF TÁRLAC (TAGÁLOGS).



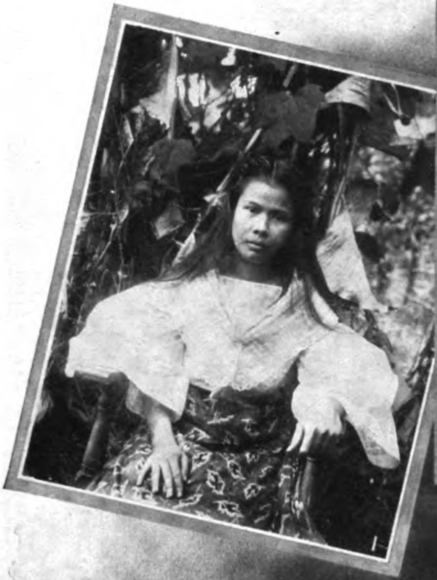
ENUMERATORS, PROVINCE OF LEPANTO-BONTOC (IGOROTS).

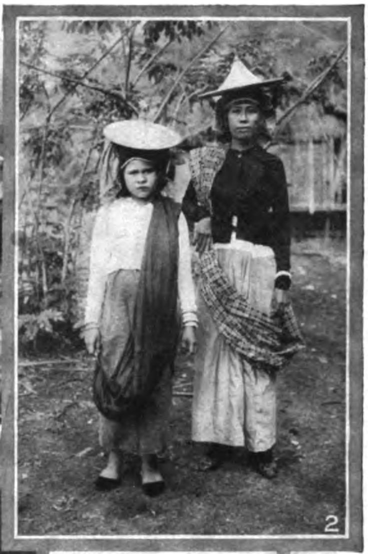


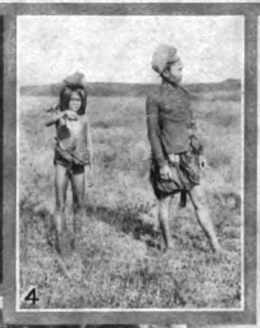
1. CARABAO CARTS. 2. HEMP FIBER AS BROUGHT TO MARKET. 3. TROTTING BULL OF PANAY. 4. TYPICAL WOODEN-WHEELED BULL CART. 5. CARABAO WITH SLED.

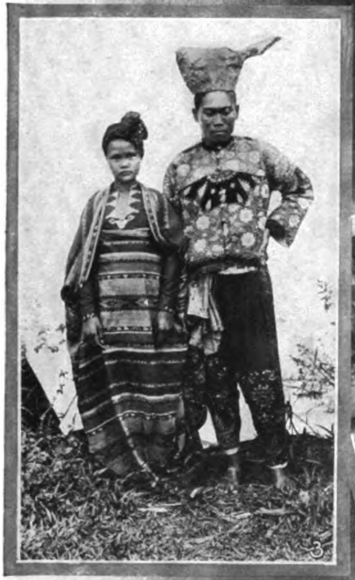

1
CENSO DE FILIPINAS
U.S.
2
3

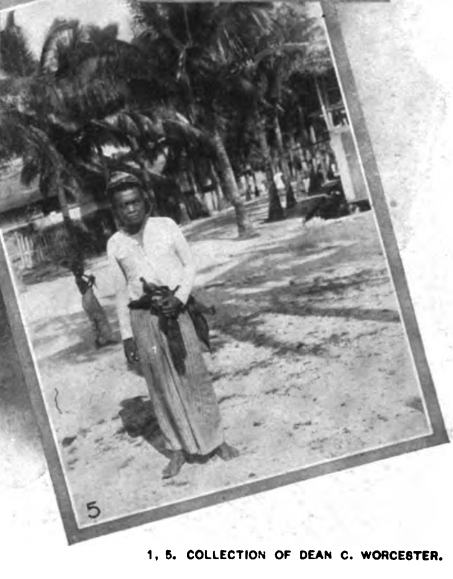
CENSUS ENUMERATORS, PROVINCE OF LA LAGUNA (TAGÁLOGS).





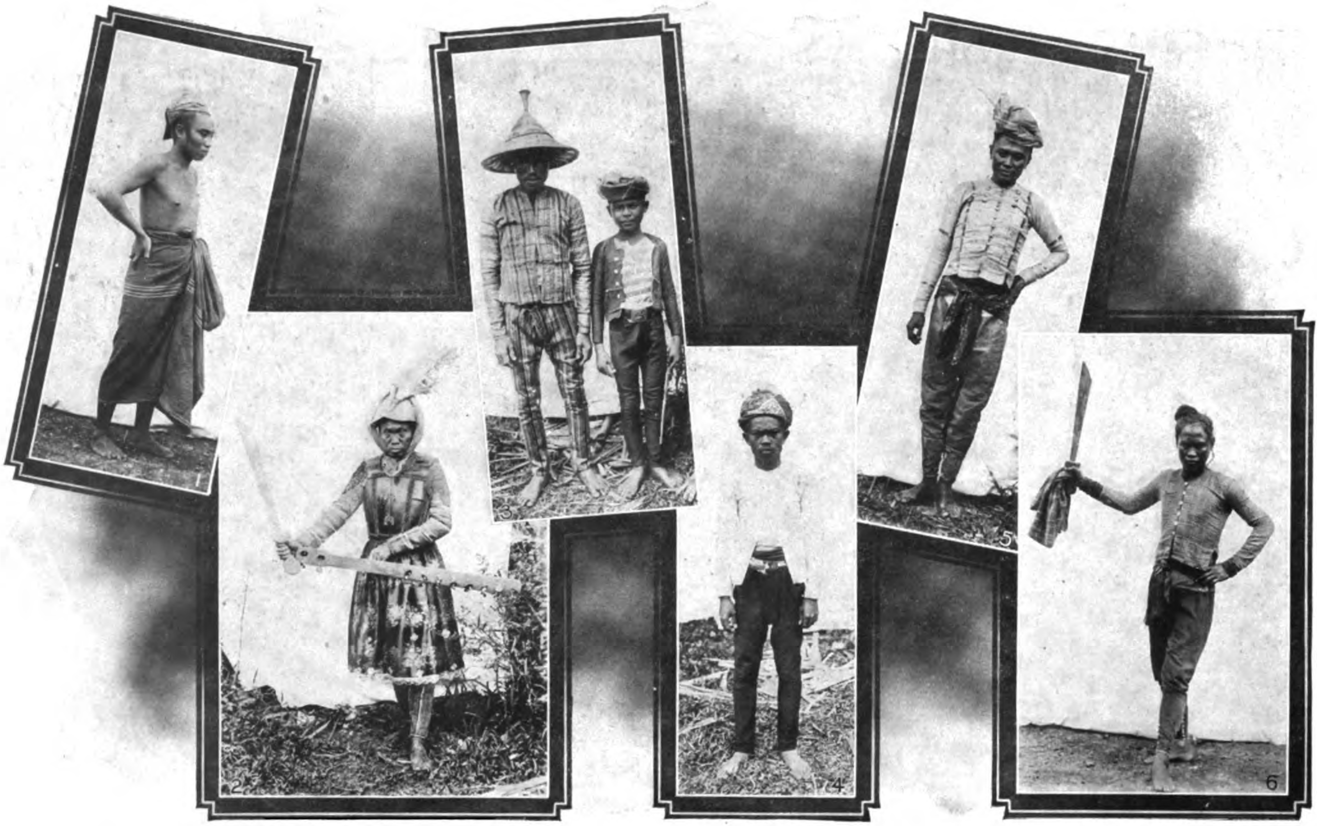




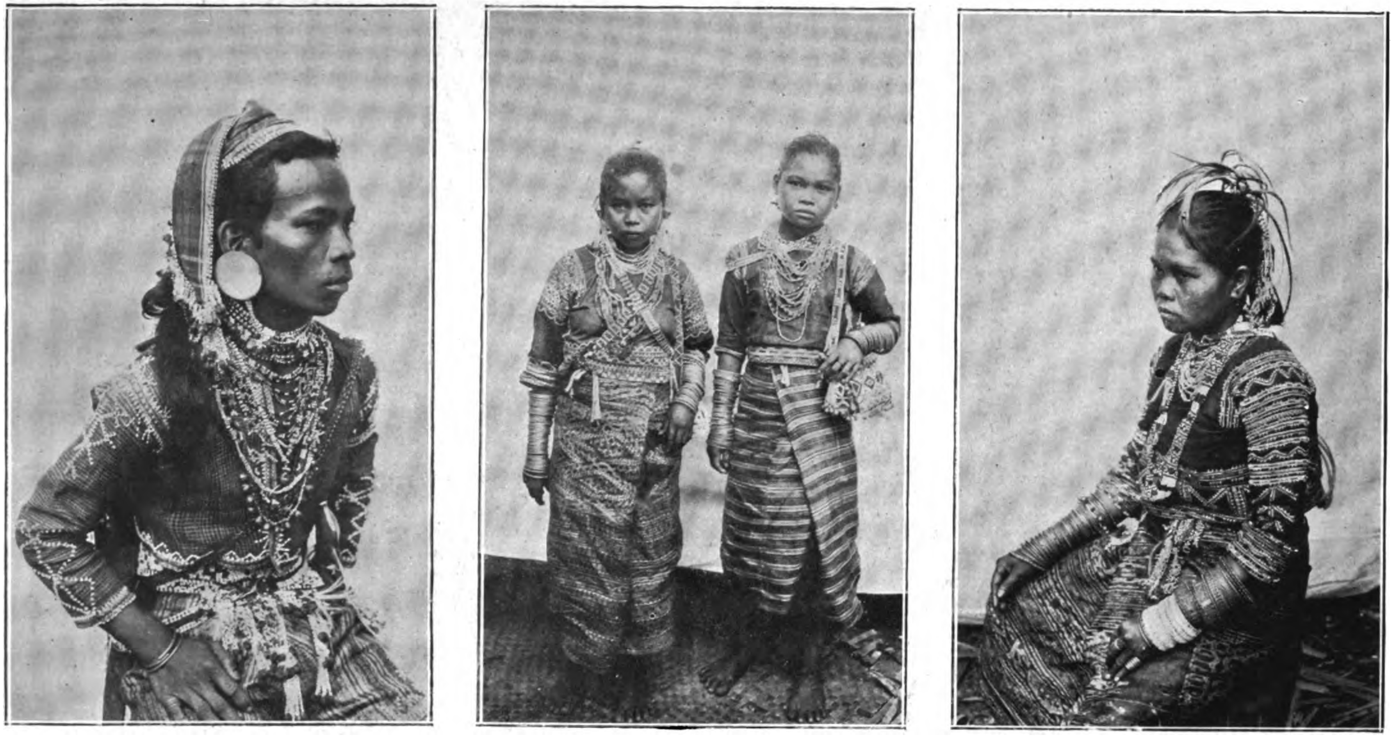


1, 5. COLLECTION OF DEAN C. WORCESTER.

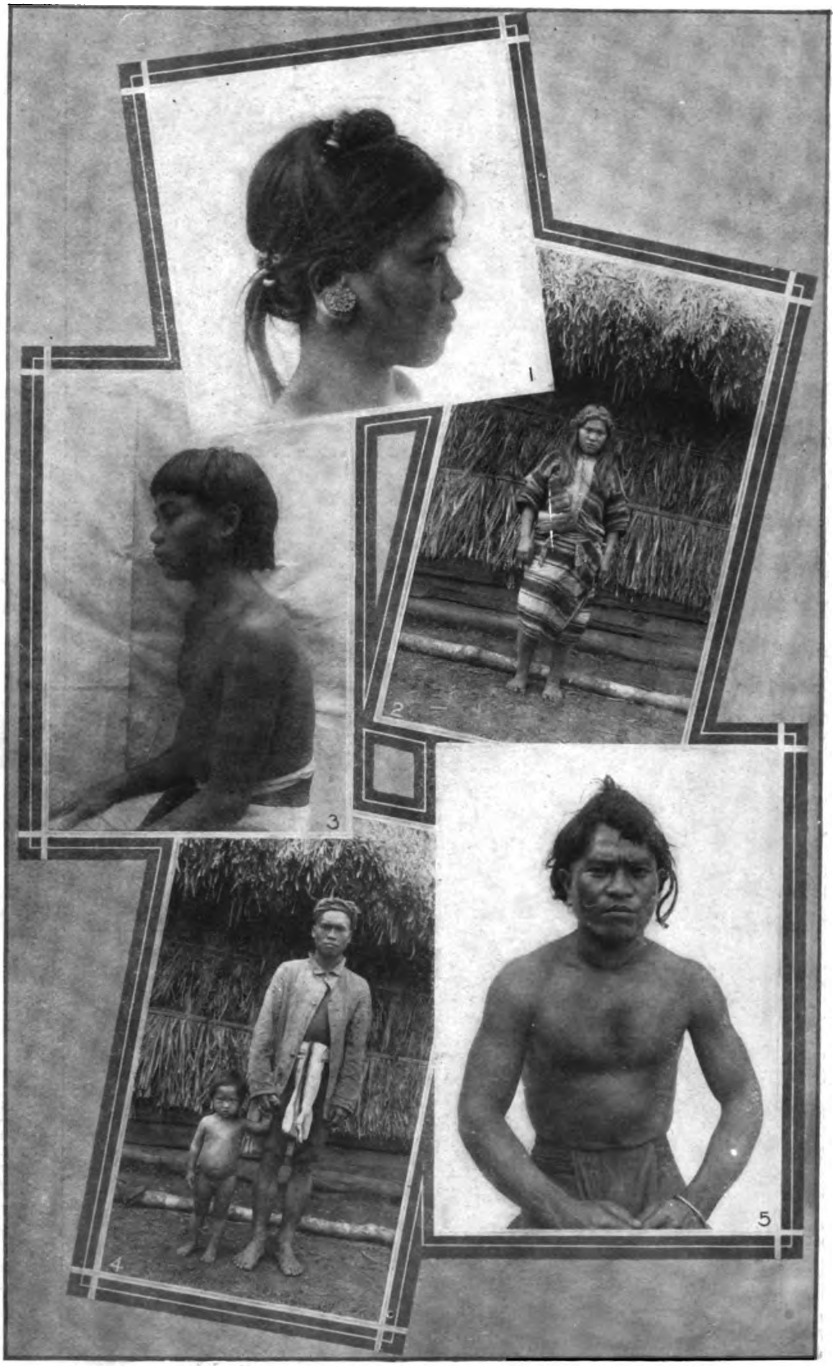
1. MAGUINDANAO MORO—WIFE OF CHIEF ALI. 2. MORO WOMEN OF UPPER CLASS, ZAMBOANGA. 3. DATO AND BRIDE. 4. MOROS OF LAKE LANAO, MINDANAO. 5. JOLÓ MORO, ADULT MALE.



1. MORO SHOWING ONE WAY OF WEARING THE SARONG. 2. SANGUIL MORO WARRIOR IN BRASS HELMET AND CUIRASS. 3. SÁMAL MOROS, CHARACTERISTIC DRESS. 4. SÁMAL MORO OF ZAMBOANGA. 5. MALANAO MORO. 6. YAKAN MORO.

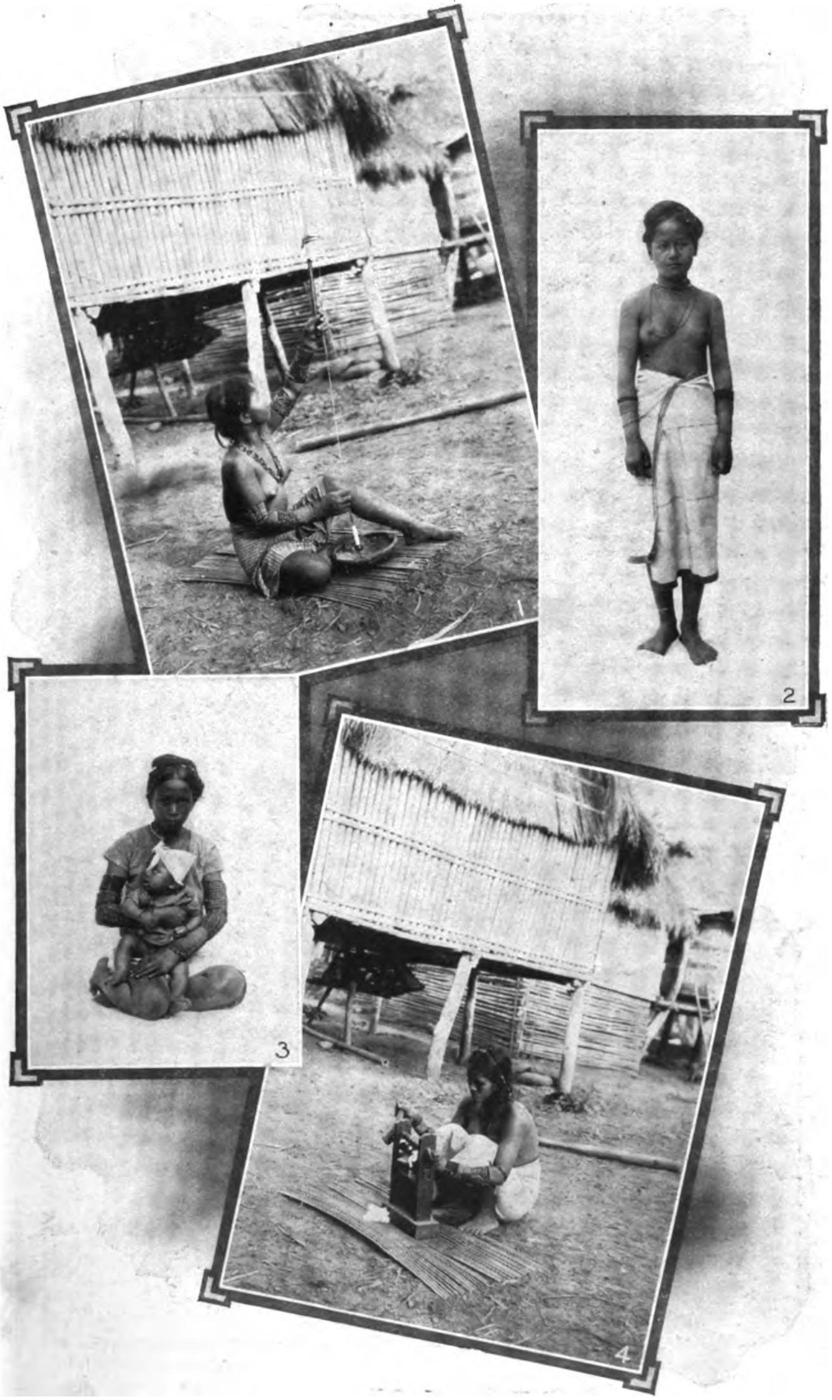


BAGOBOS, ISLAND OF MINDANAO.



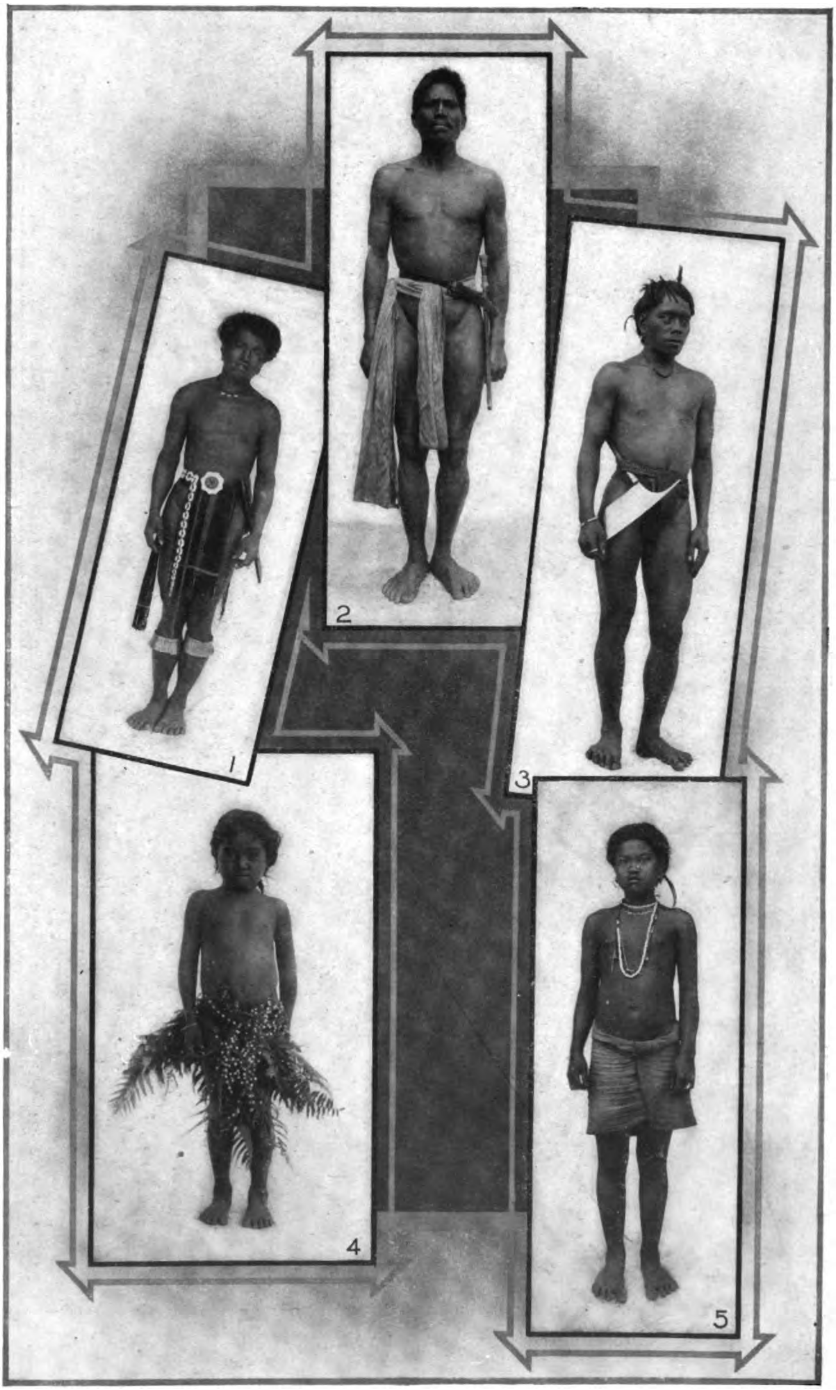
1, 3, 4, 5. COLLECTION OF DEAN C. WORCESTER.

1. IGOROT GIRL, SHOWING METHOD OF STRETCHING HOLE IN LOBE OF EAR. 2. IGOROT WOMAN. HAIR BOUND UP WITH GRASS CHAPLET. 3. IGOROT BOY. 4. IGOROT FATHER AND DAUGHTER. 5. IGOROT WARRIOR IN HIS PRIME.



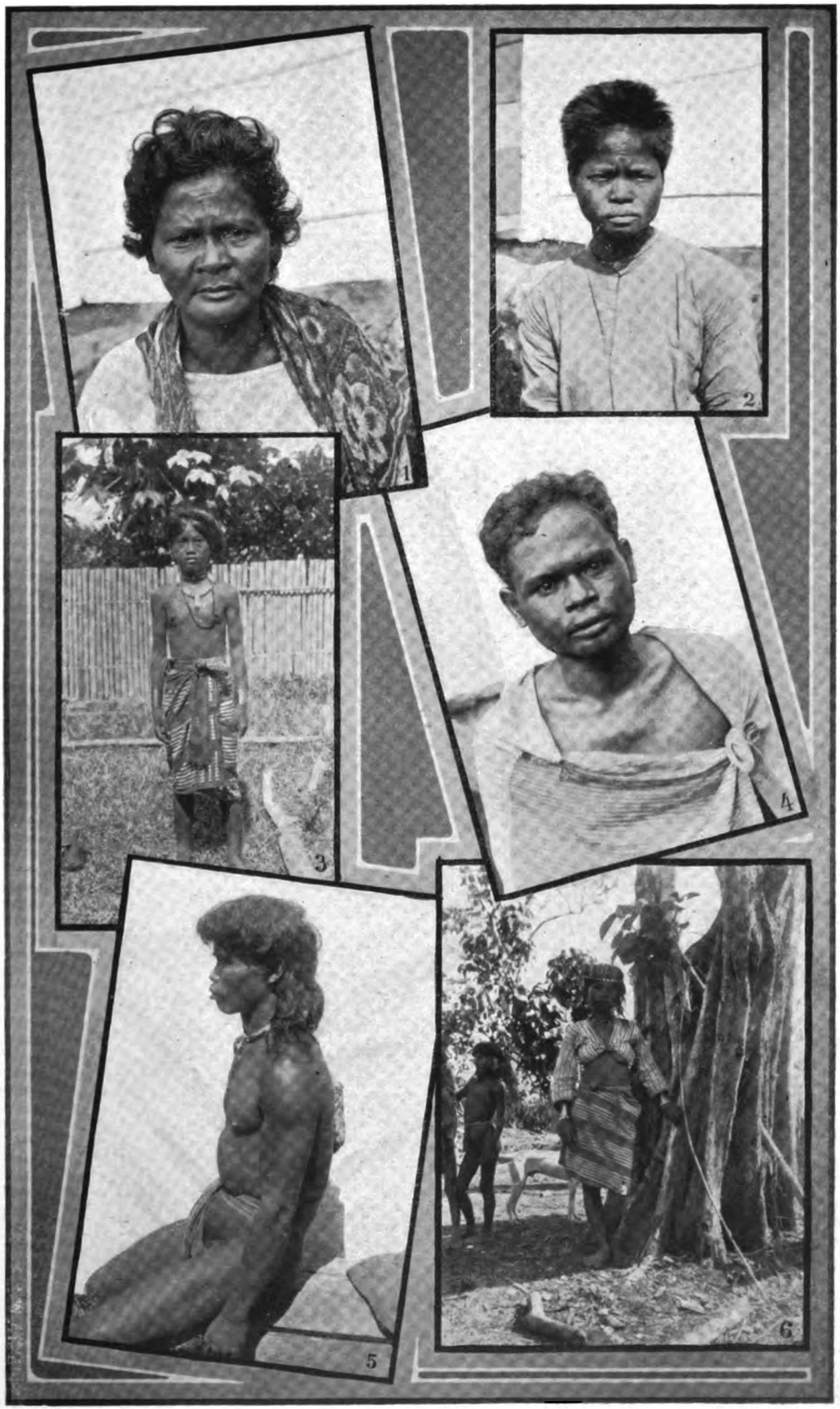
COLLECTION OF DEAN C. WORCESTER.

TINGUIANES.—1. GIRL SPINNING. 2. YOUNG WOMAN IN TYPICAL DRESS. 3. WOMAN AND CHILD. 4. GIRL OPERATING COTTON GIN.



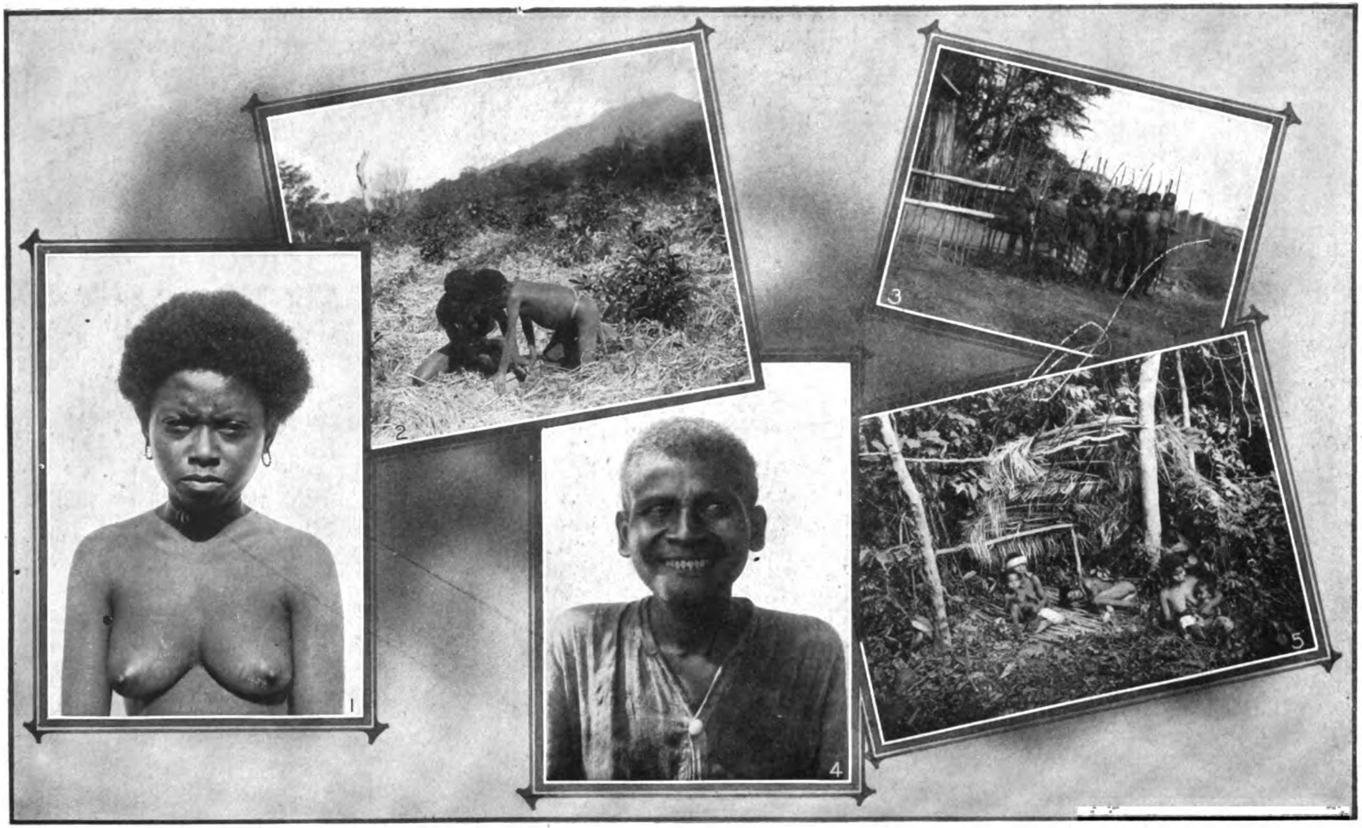
COLLECTION OF DEAN C. WORCESTER.

1 MAYOYAO IGOROT, "HEADMAN" OF BANAUE. 2. IGOROT. 3. IGOROT HEAD-HUNTER, LEPANTO-BONTOC. 4. IGOROT GIRL IN FERN-LEAF COSTUME. 5. MAYOYAO IGOROT, YOUNG WOMAN.



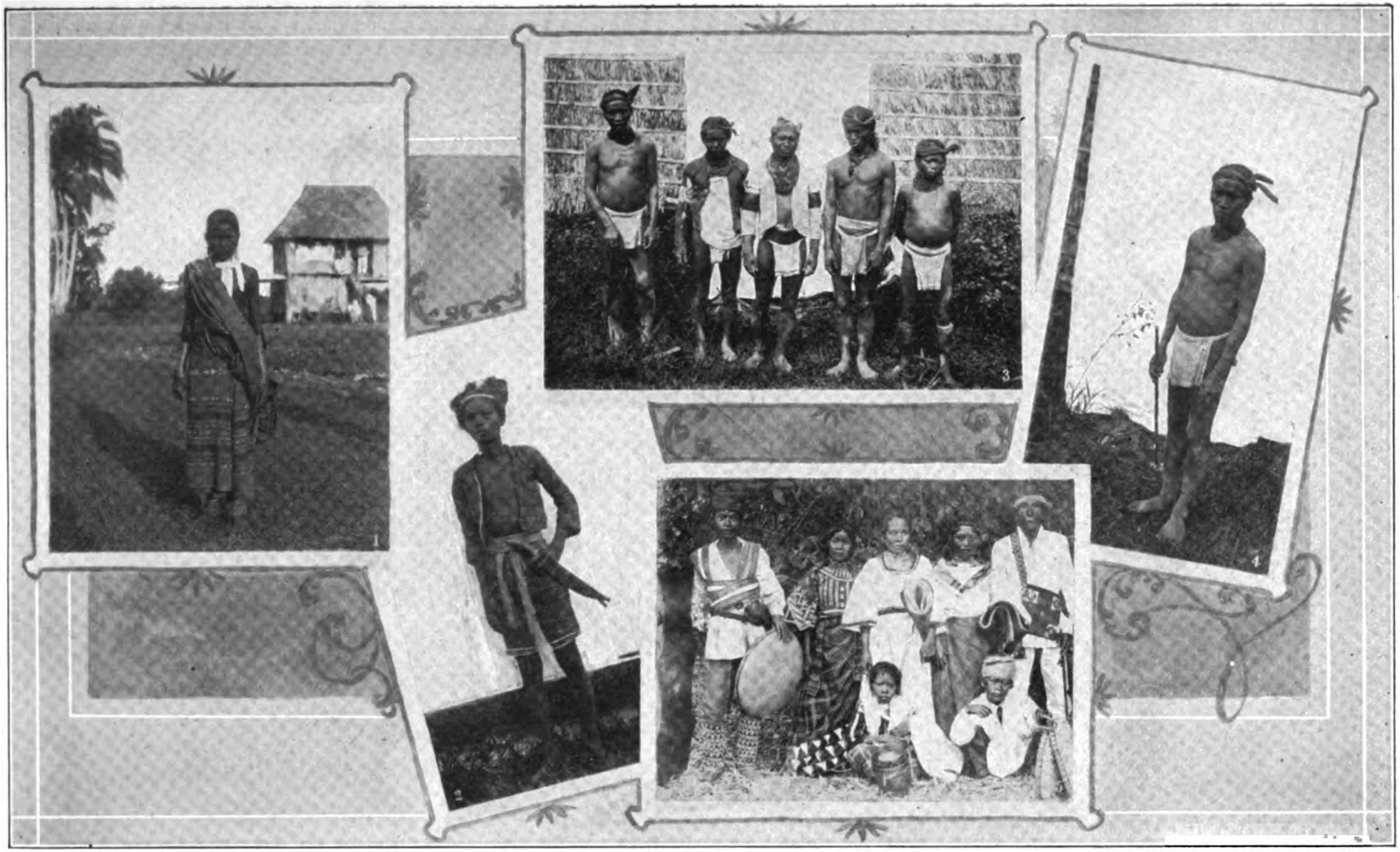
COLLECTION OF DEAN C. WORCESTER.

1. NATIVE WOMAN WITH NEGRITO BLOOD (REMONTADO). 2. YOUNG MAN (REMONTADO). 3. GIRL (REMONTADO). 4. NATIVE MAN WITH NEGRITO BLOOD (REMONTADO). 5. GIRL (GADDÁN). 6. WOMAN (GADDÁN).



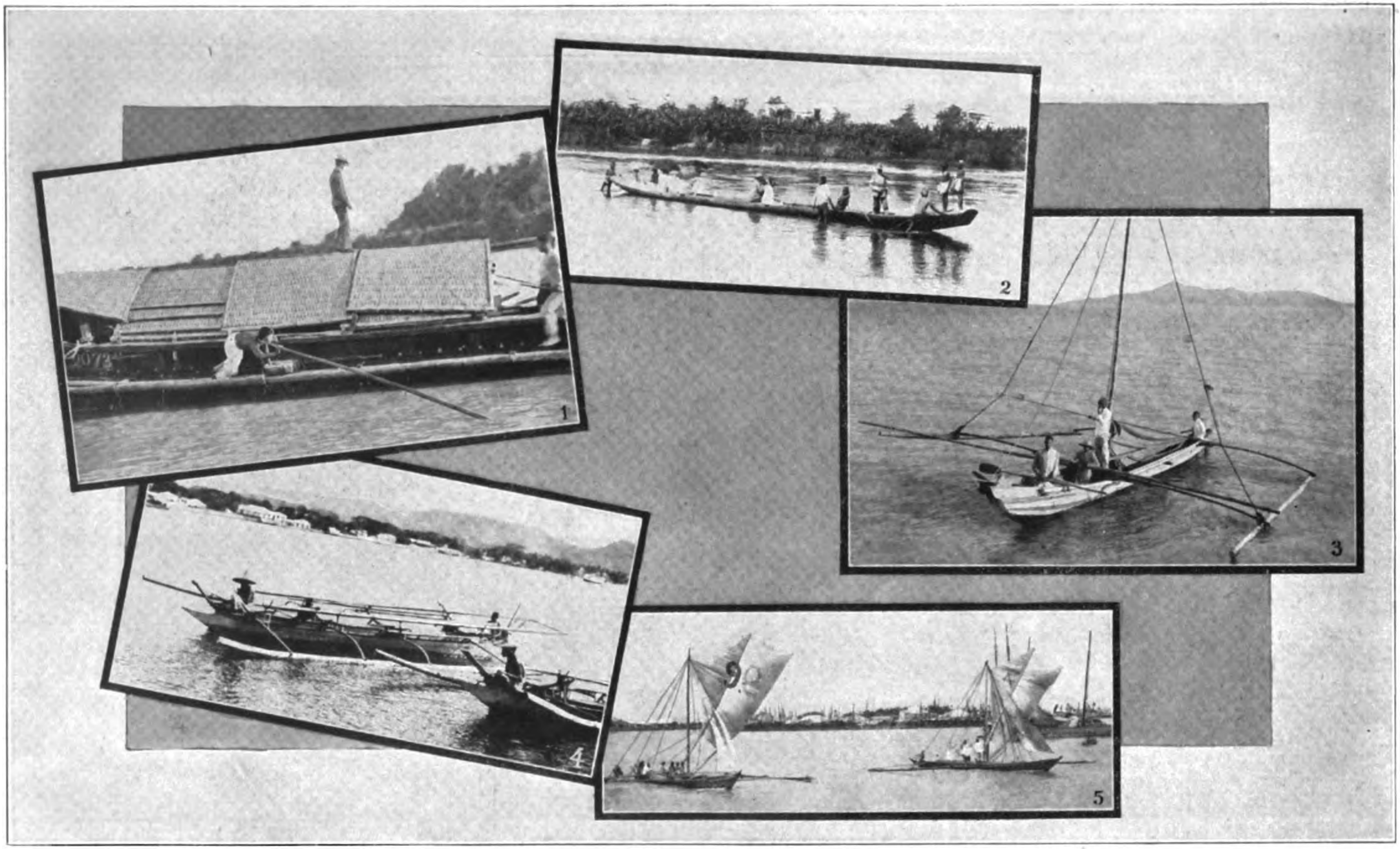
1, 2, 4. COLLECTION OF DEAN C. WORCESTER.

1. YOUNG NEGRITO WOMAN. 2. NEGRITOS MAKING FIRE BY RUBBING TWO PIECES OF BAMBOO TOGETHER. 3. GROUP OF NEGRITOS, PROVINCE OF ZAMBALES. 4. NEGRITO SHOWING FILED TEETH. 5. NEGRITOS IN THE FOREST, PROVINCE OF ISABELA.

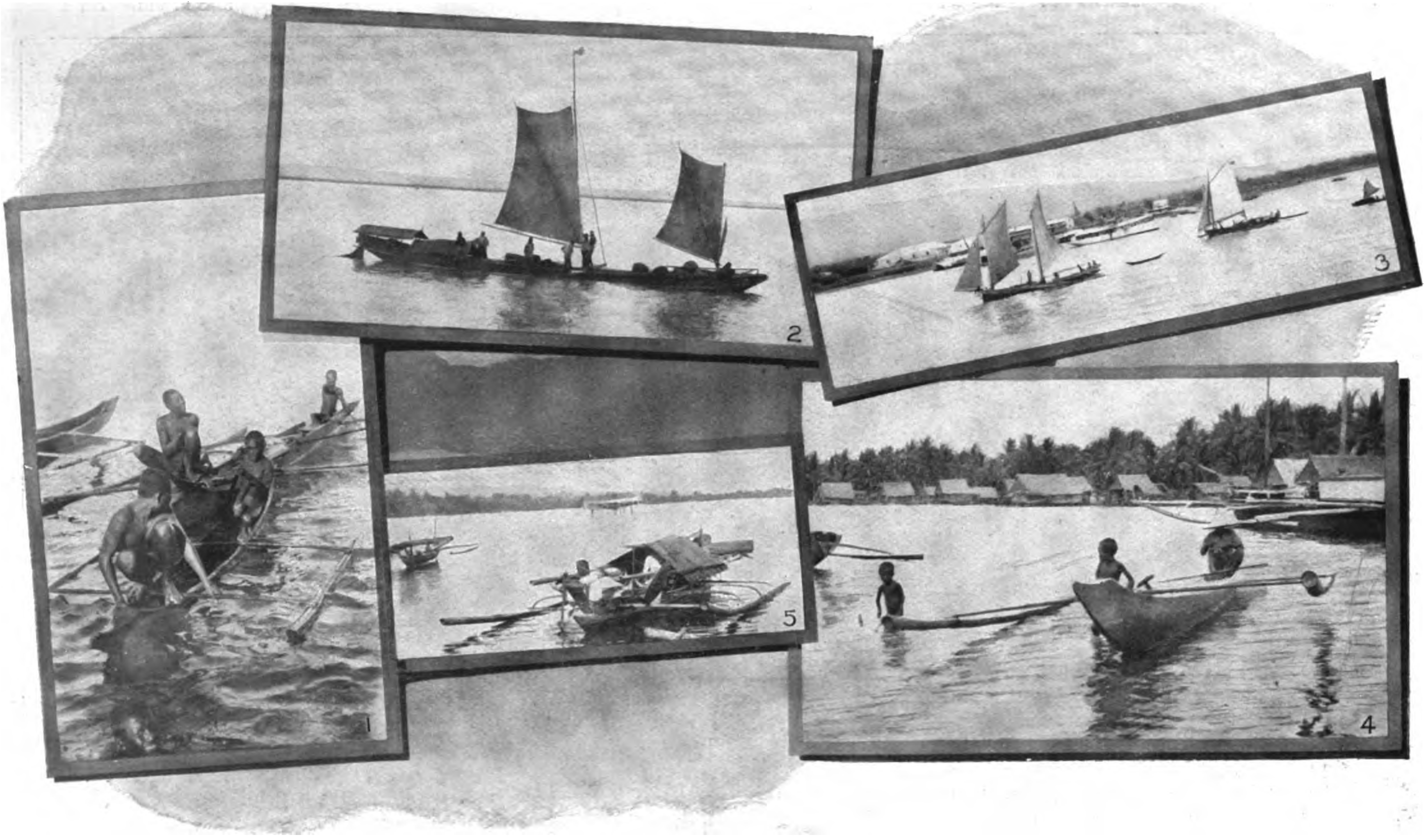


1, 2. COLLECTION OF DEAN C. WORCESTER.

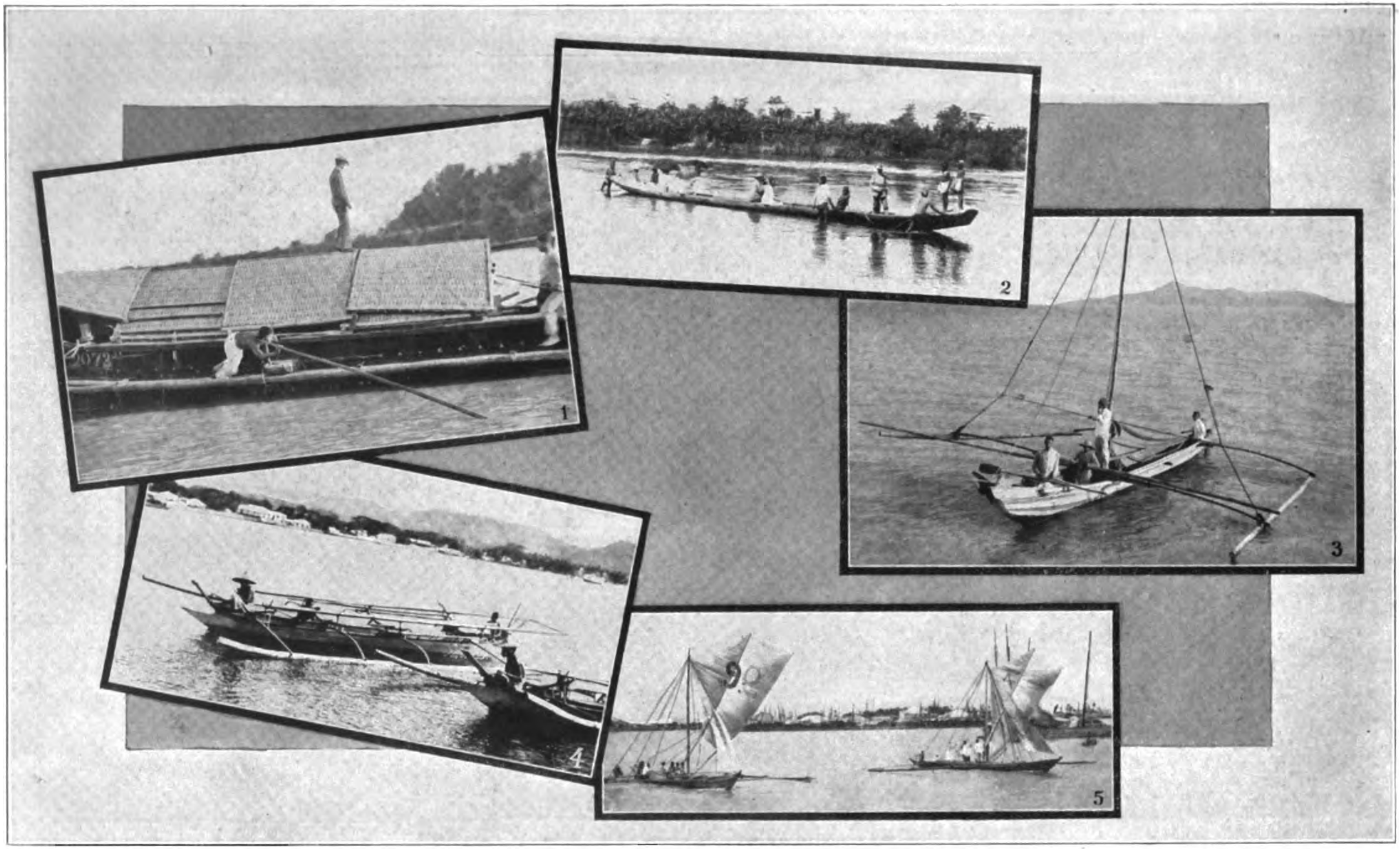
1. TIRURAY DANCER AT COTTABATO. 2. ATA OF DÁVAO. 3. GROUP OF MANGYANS OF MINDORO. 4. MANGYAN, PROVINCE OF MINDORO. 5. MONTESES, PROVINCE OF MISAMIS.



1. POLING A CASCO. 2. CANOES MADE FROM THE LOG OF A SINGLE TREE. 3. SINGLE-STICK OUTRIGGER, LAGUNA DE BAY, LUZÓN. 4. MORO VINTA. 5. OUTRIGGERED SAILING CRAFT OF PANAY AND LEYTE.



1. MORO DIVERS, TAPUL GROUP. 2. DOUBLE-MASTED OUTRIGGER, LAGUNA DE BAY, LUZÓN. 3. SAILING CRAFT, VISAYAS. 4. MORO VINTA AT JOLÓ. 5. MORO VINTA WITH THATCHED AWNING.



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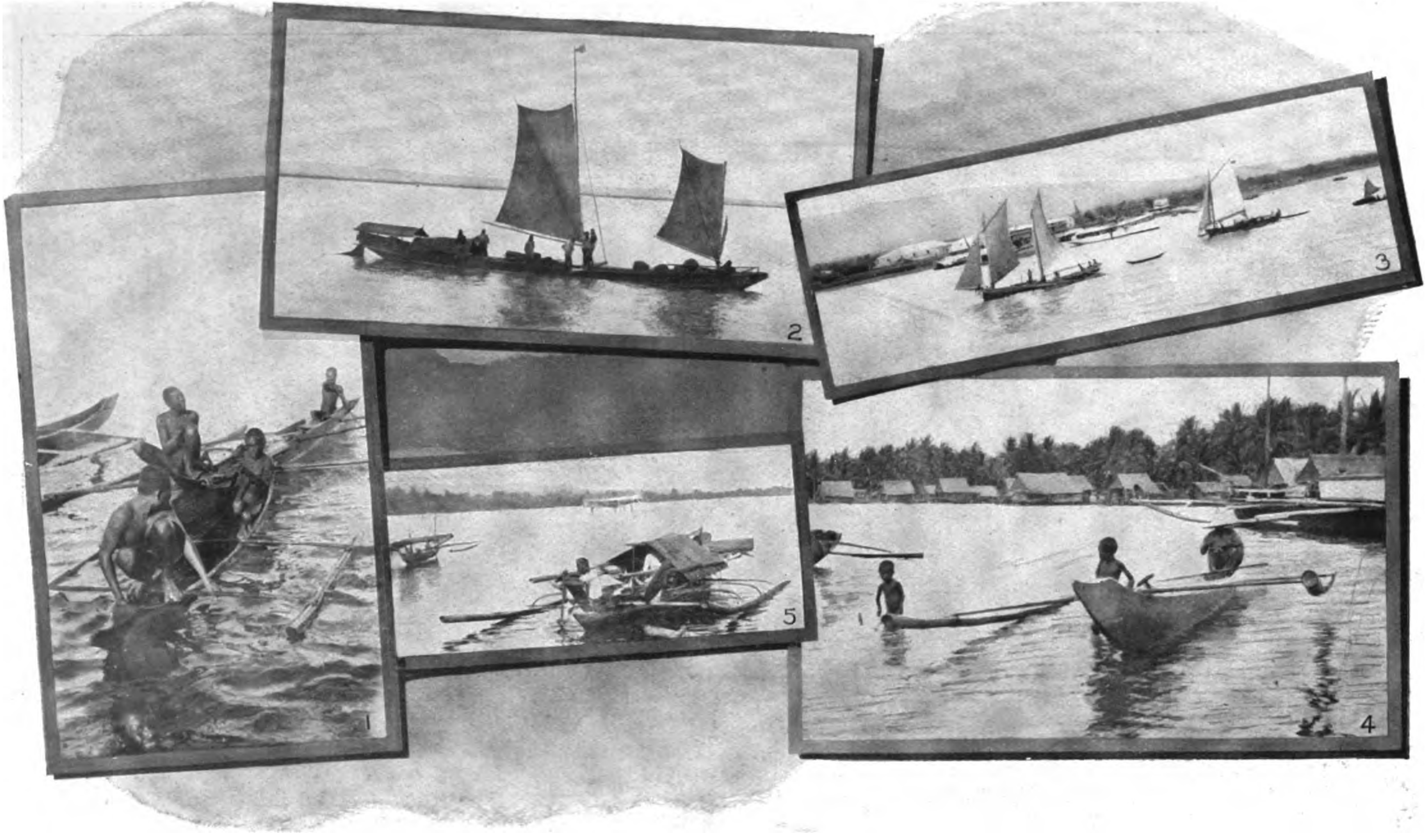

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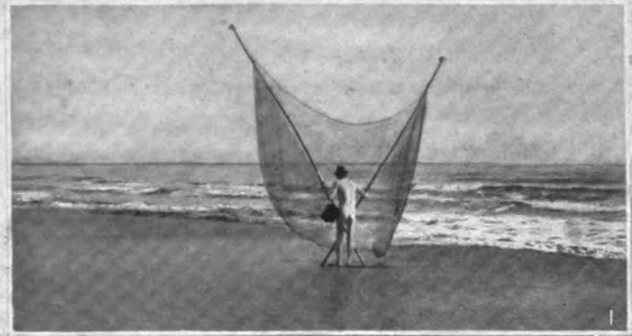
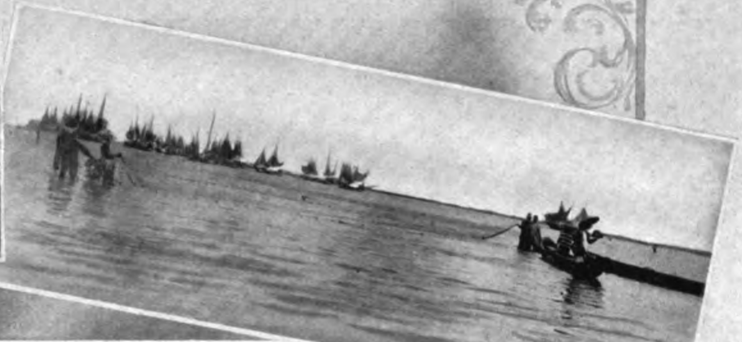
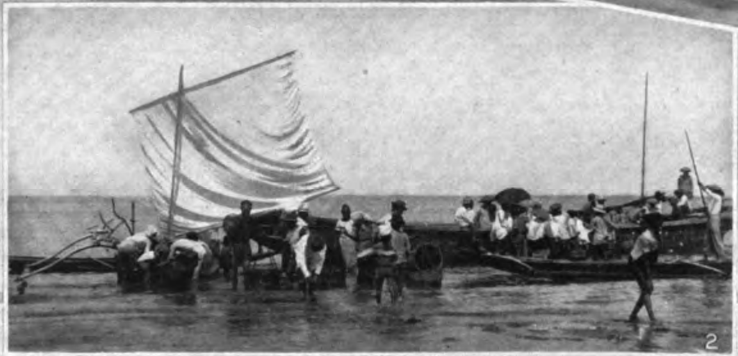
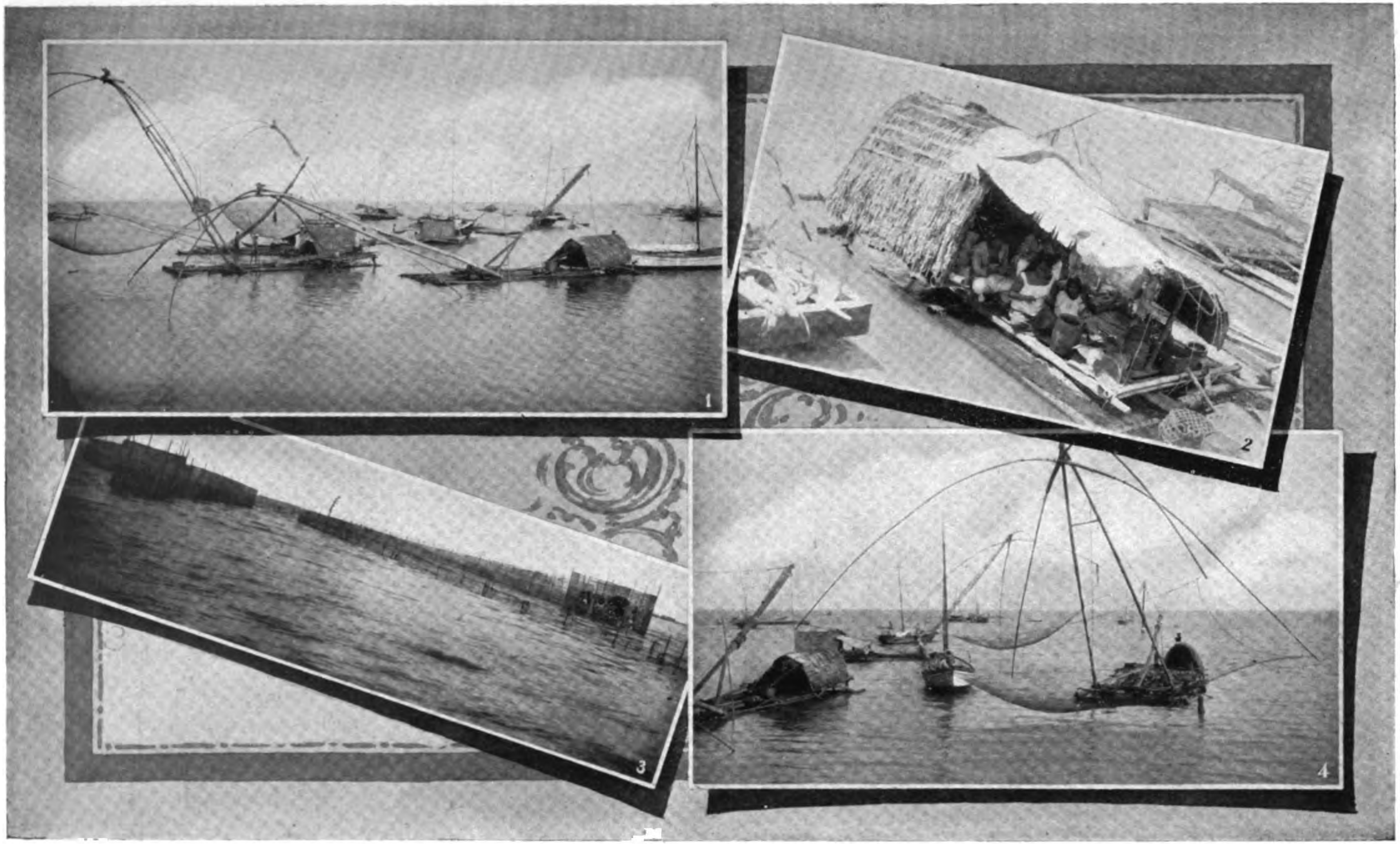


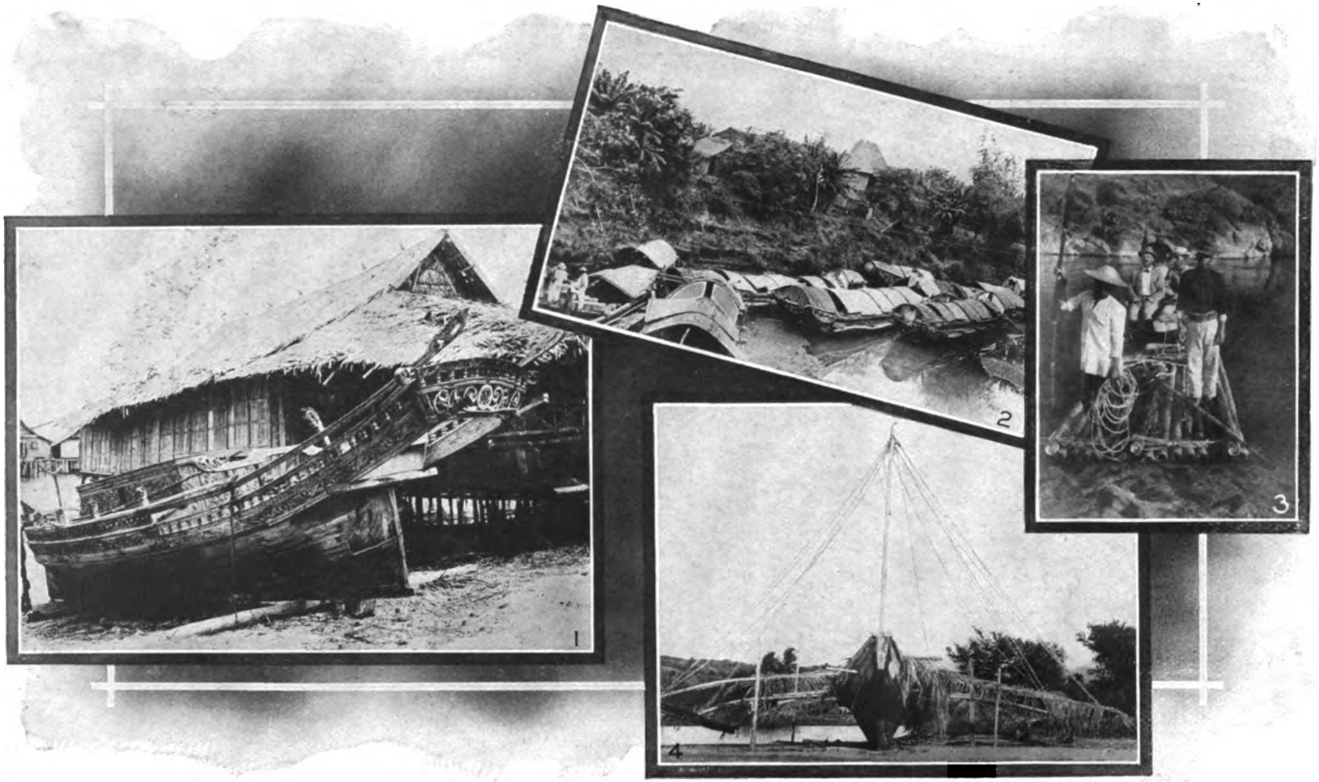




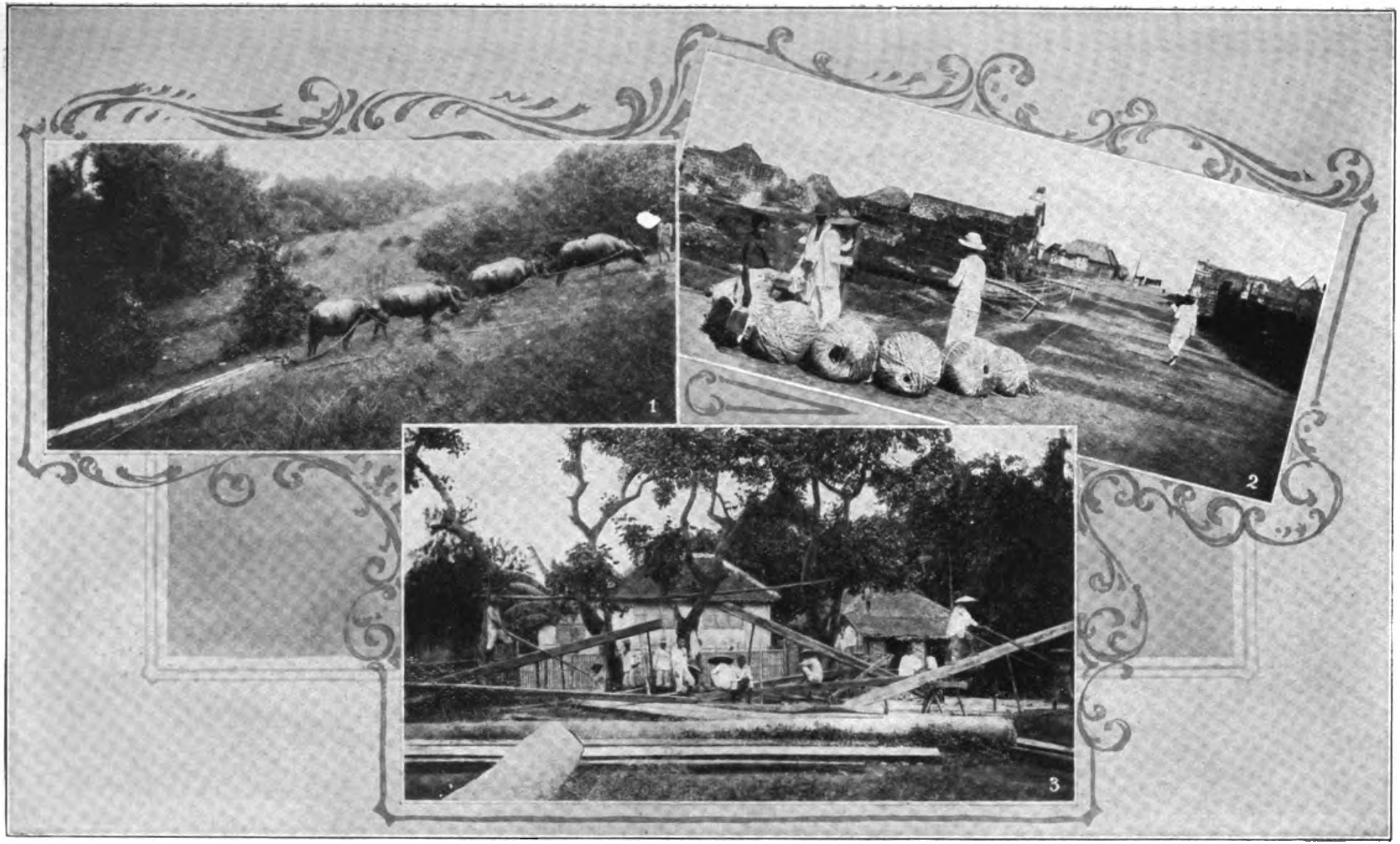
1. FISHING IN THE SURF WITH A SCOOP NET. 2. SELLING THE CATCH AT THE BEACH. 3. SEINE FISHING, WITH FLEET OF FISHING BOATS IN THE BACKGROUND.



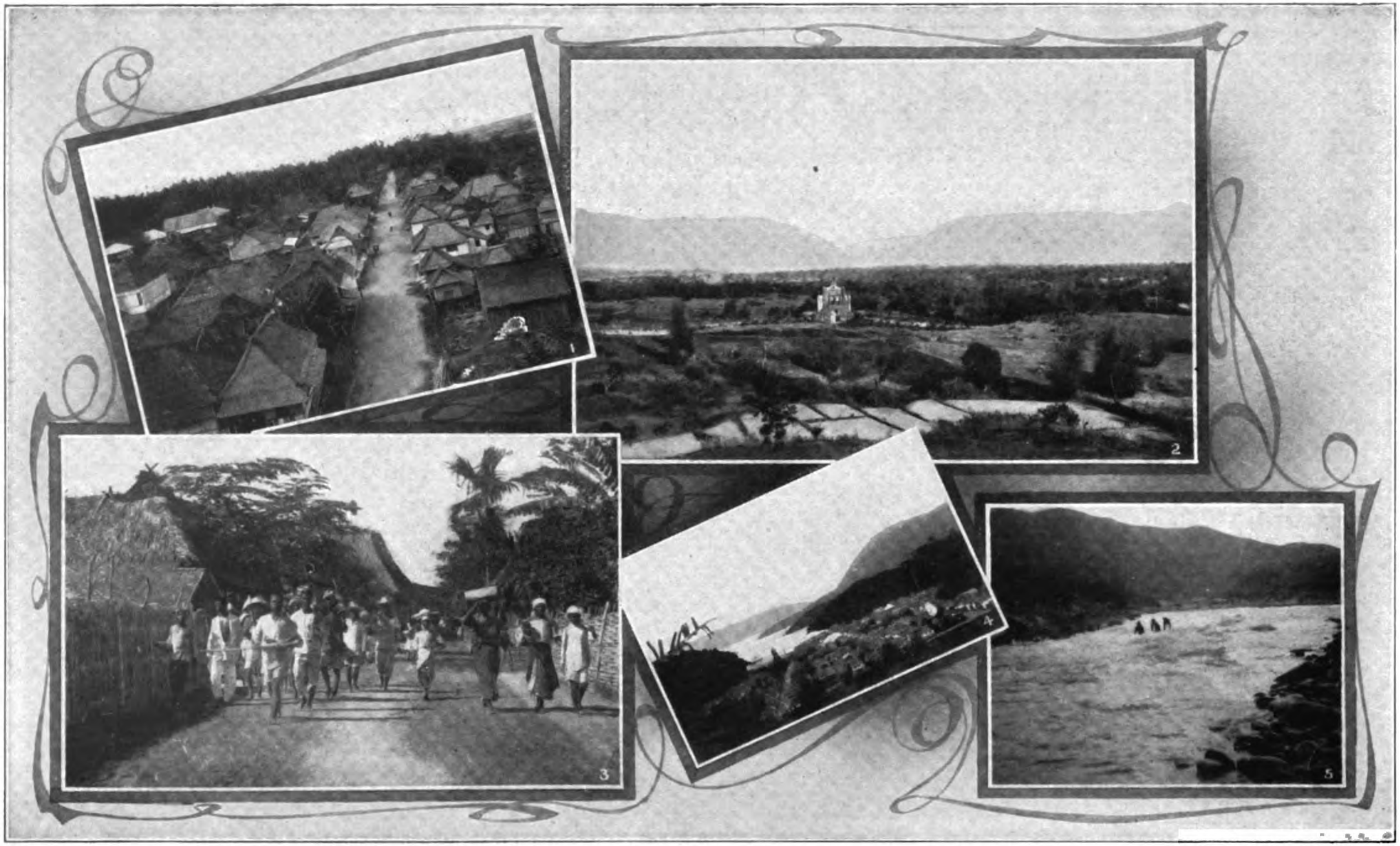
1. FISH NETS IN POSITION FOR CATCH. 2. LIFE ON THE NET RAFT. 3. FISH WEIRS, MOUTH OF PÁSIG RIVER. 4. NET RAFT. NET IN POSITION FOR CASTING.



1. OLD MORO PIRATE BOAT. 2. CASCOES, OR THE COMMON LIGHTER OF THE PHILIPPINES. 3. PASSENGER RAFT ON THE MAGAT RIVER, PROVINCE OF NUEVA VIZCAYA. 4. SINGLE-STICK OUTRIGGER.

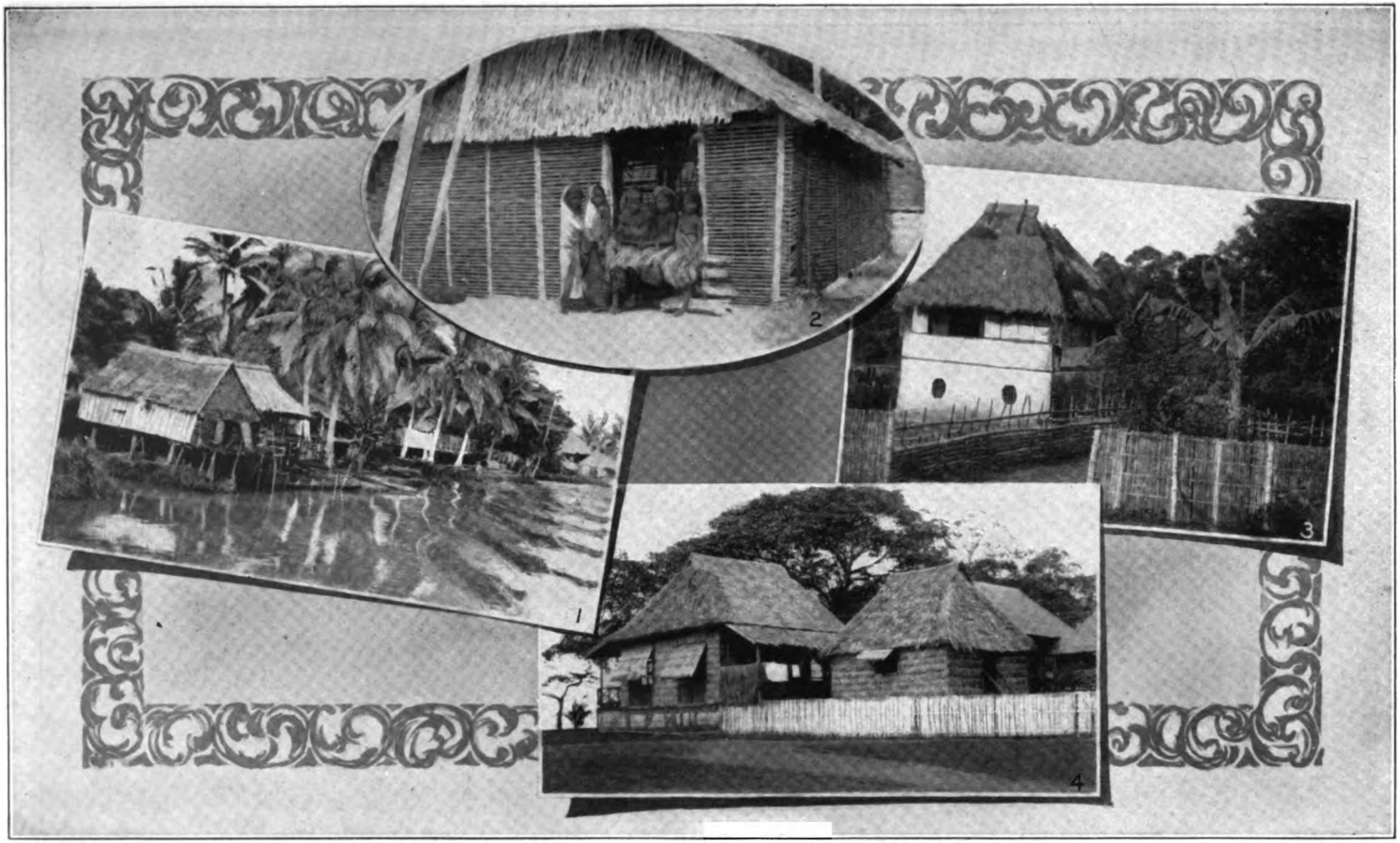


1. HAULING LOGS WITH CARABAO. 2. ROPEMAKING, MANILA. 3. FILIPINO SAWING MILL.

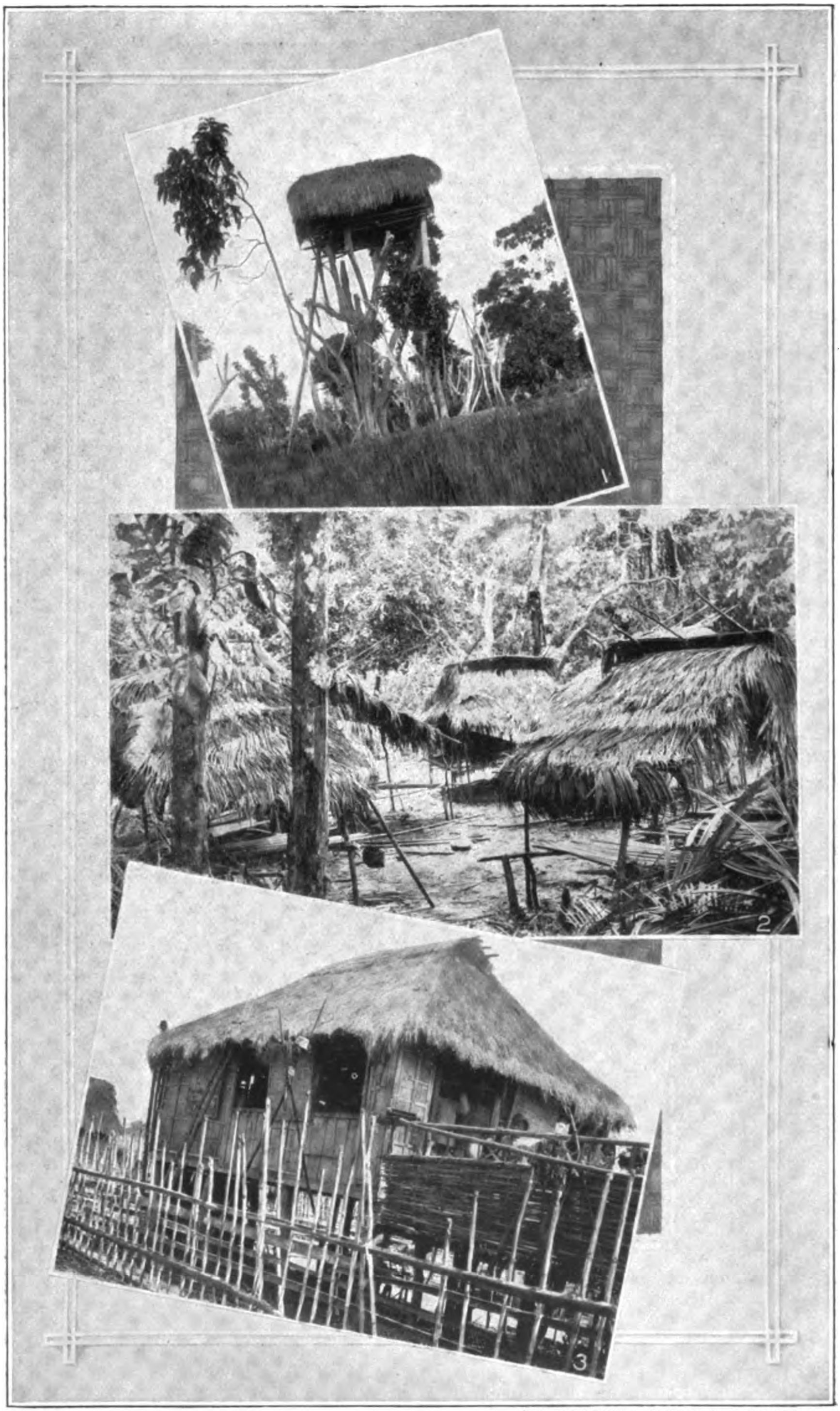


COLLECTION OF G. R. PUTNAM.

1. TYPICAL FILIPINO VILLAGE, BOAC, MARINDUQUE. 2. THE GAP OF VIGAN, ILOCOS SUR. 3. STREET IN BALÍUAG (TAGÁLOGS), BULACÁN. 4. VILLAGE OF ROMBLÓN.
5. DESCENDING MAGAT RIVER ON RAFT—NUEVA VIZCAYA.

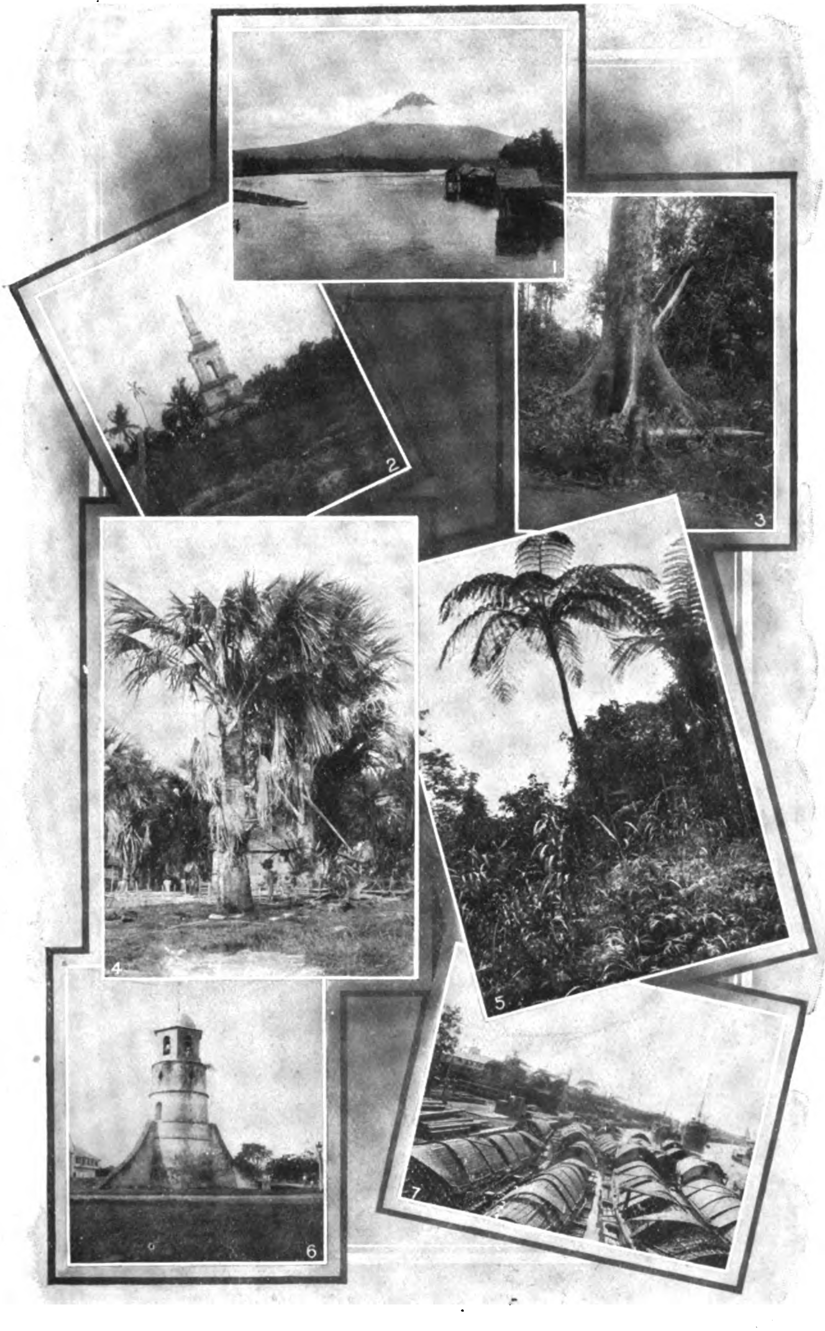


1. MORO HOUSES ON RÍO GRANDE, COTTABATO, MINDANAO. 2. MORO SPLIT-BAMBOO HOUSE OF COMMON PEOPLE AND SLAVES. 3. MIXED NATIVE ARCHITECTURE OF CIVILIZED TRIBES. STONE AND MORTAR SUBSTRUCTURE AND WOODEN FRAMEWORK. 4. EXAMPLE OF FINE NIPA STRUCTURE.



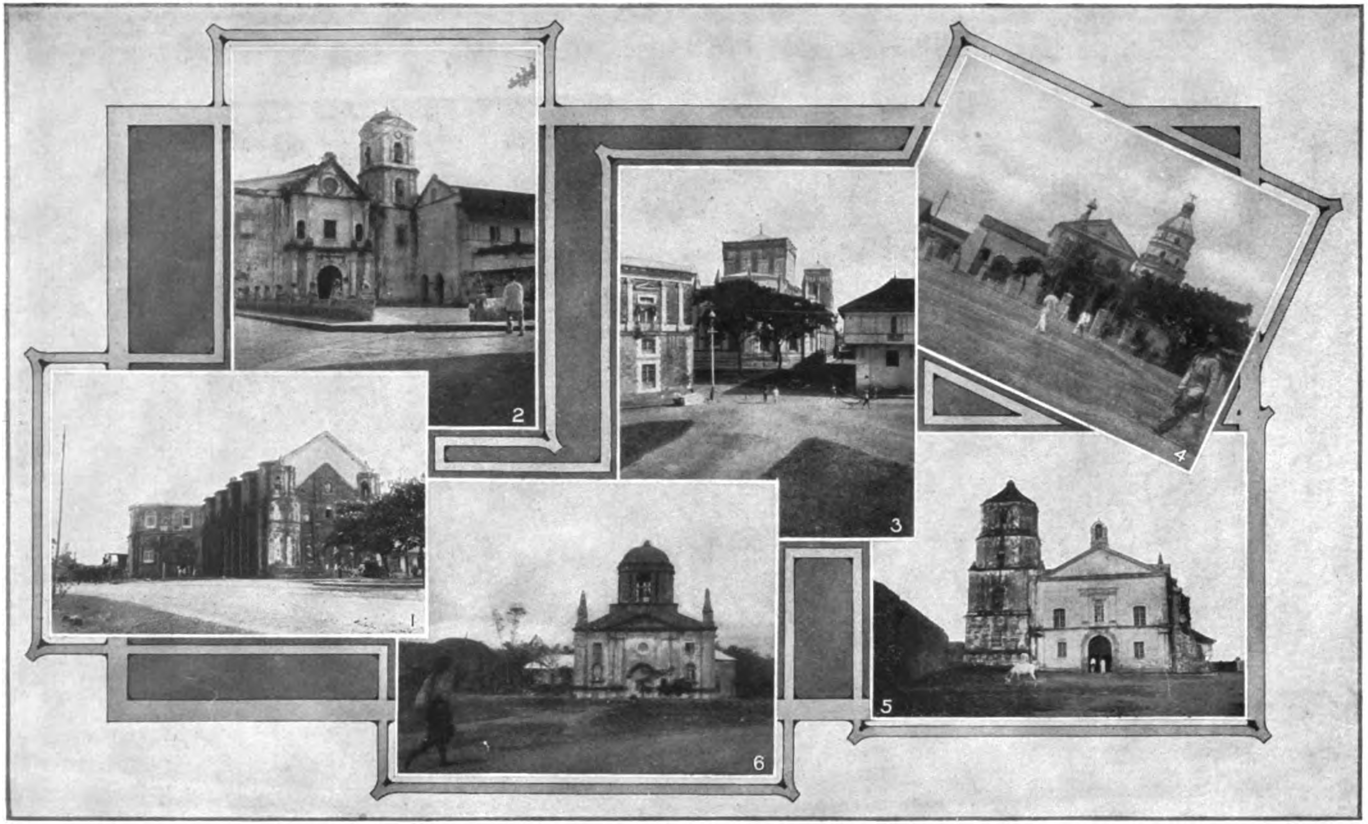
1, 3. COLLECTION OF DEAN C. WORCESTER.

1. GADDÁN TREE HOUSE. 2. A DWELLING OF THE MAMANÚAS. 3. TINGUIAN HOUSE AT PADANGITA—A FEAST IN PROGRESS.

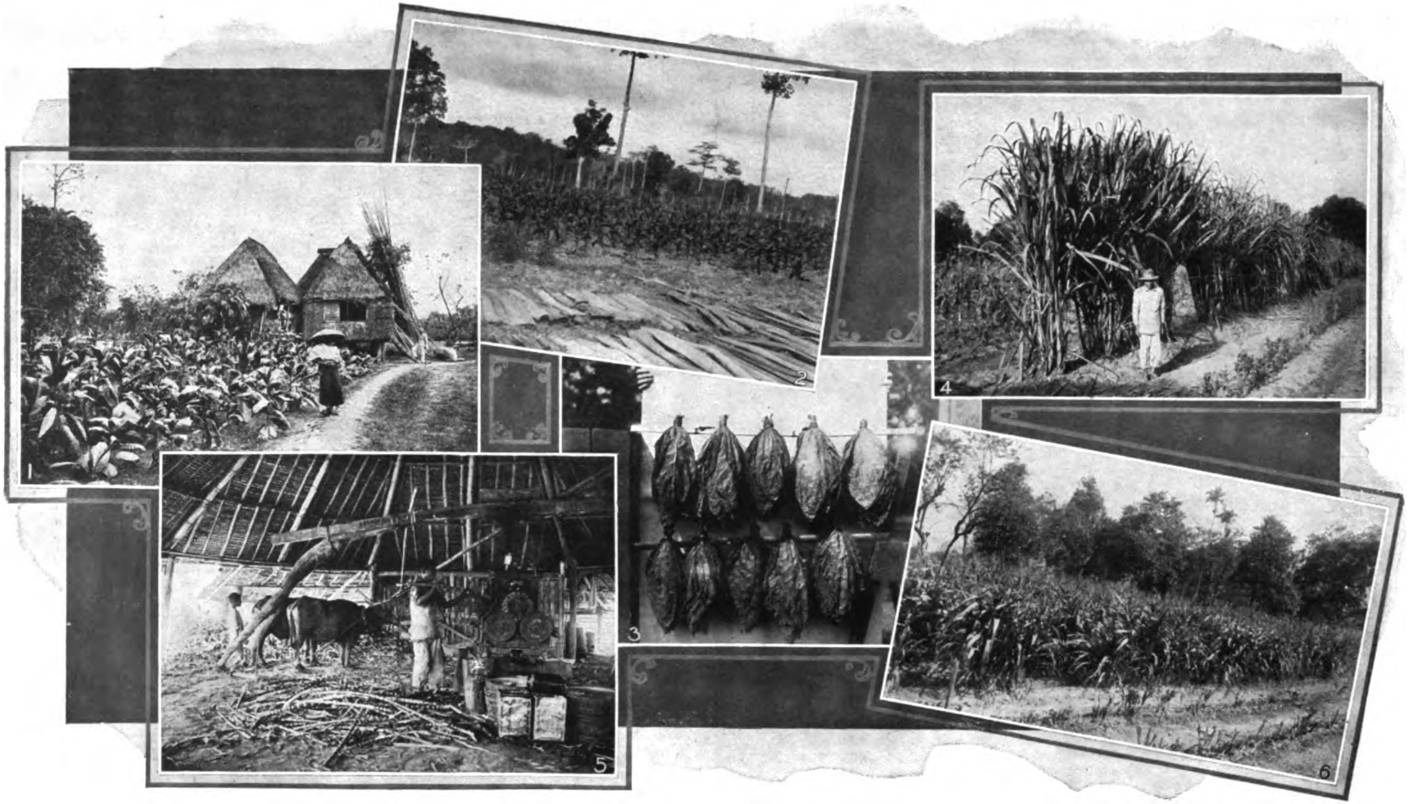


5. COLLECTION OF DEAN C. WORCESTER.

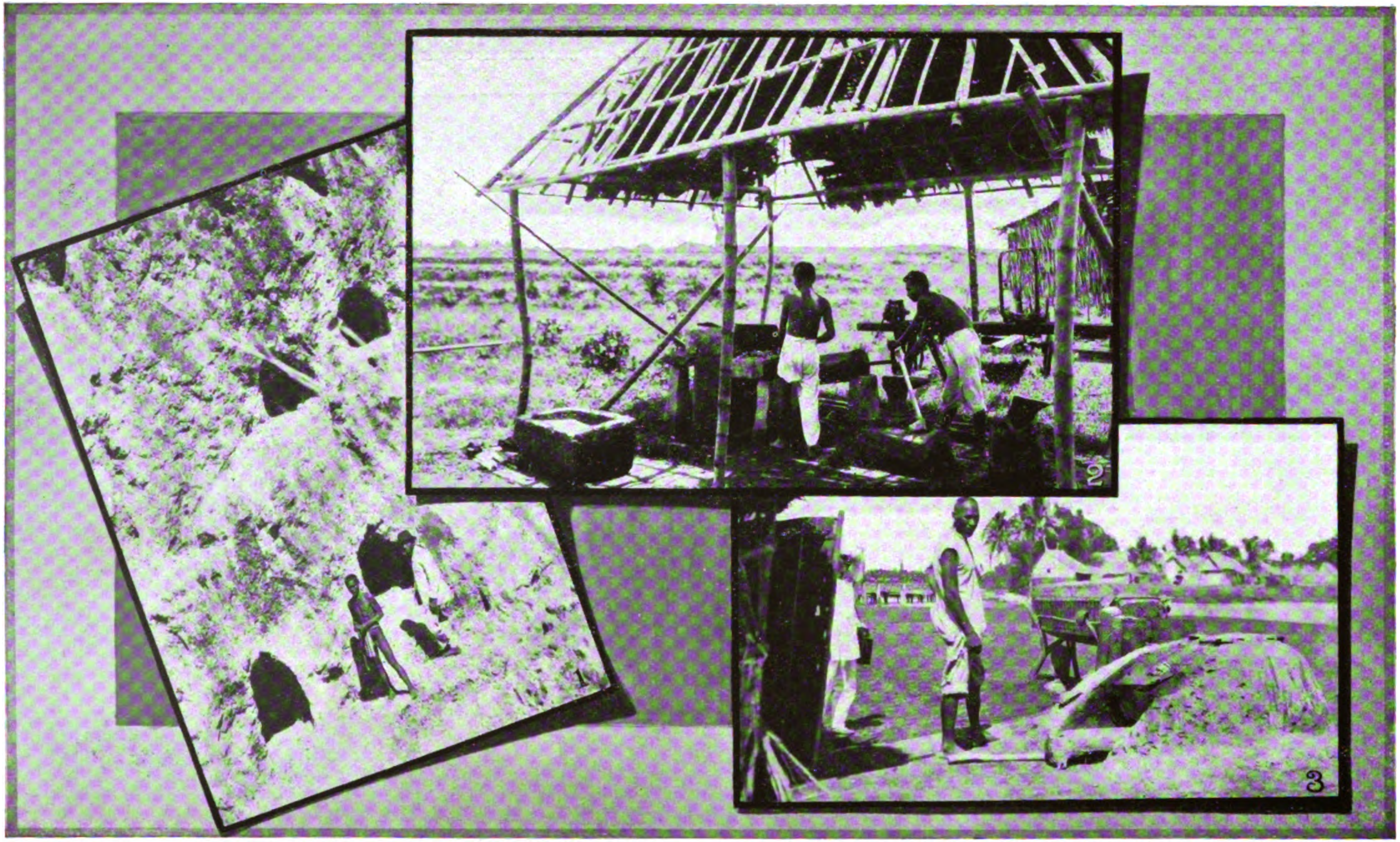
1. MAYÓN VOLCANO. 2. MAGELLAN MONUMENT, ISLAND OF MACTÁN, ERECTED ON THE SPOT WHERE HE WAS KILLED. 3. GIANT FOREST TREE OF MINDANAO, SHOWING NATURAL BUTTRESSES OF TRUNK. 4. BURÍ PALM. 5. TREE FERN, PROVINCE OF BENGUET. 6. MORO WATCHTOWER, DUMAGUETE, NEGROS ORIENTAL. 7. NATIVE BOATS.



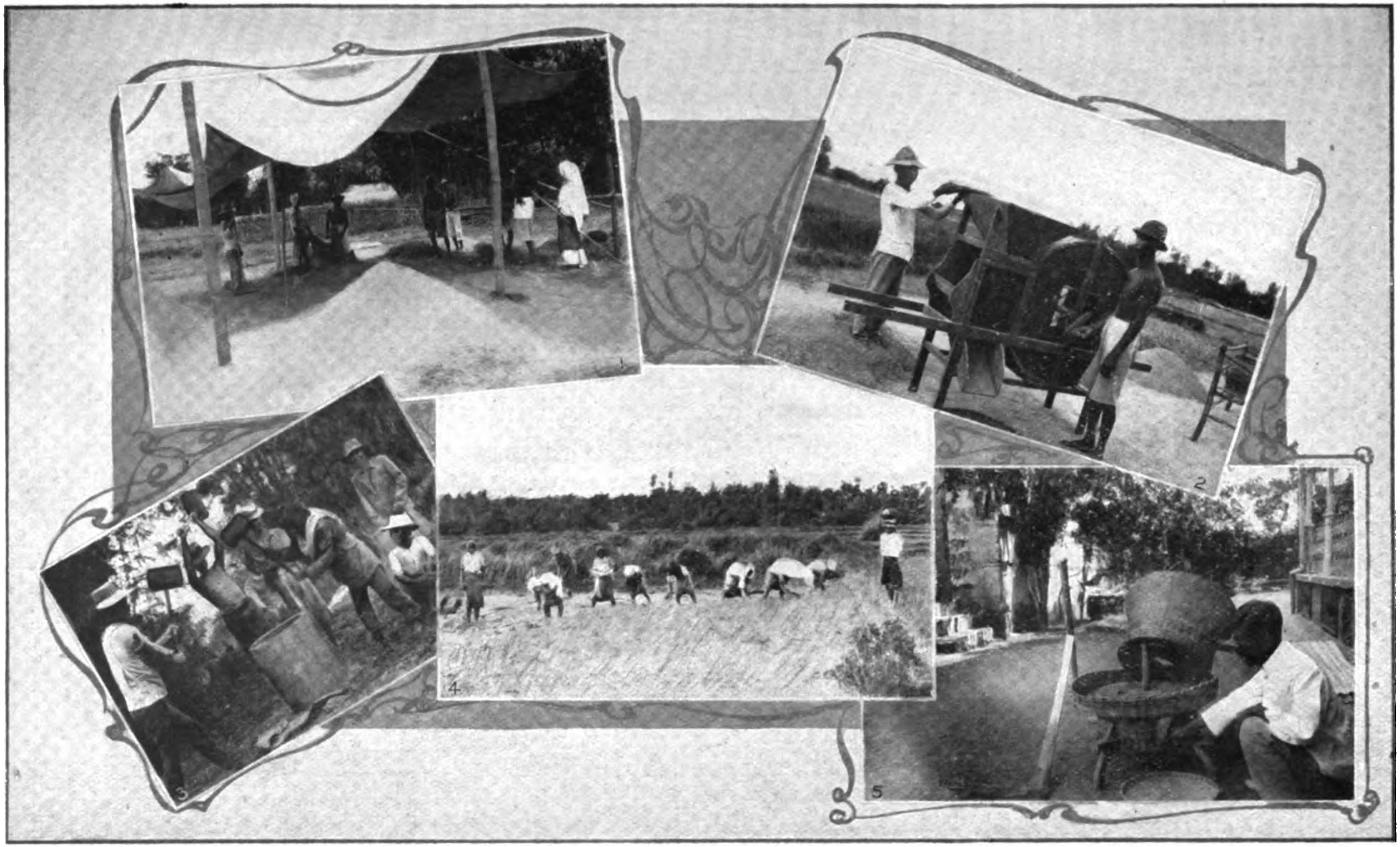
1. CHURCH AT MALATE, MANILA. 2. AUGUSTINIAN CHURCH, WALLED CITY, MANILA. 3. CHURCH OF THE RECOLETOS, WALLED CITY, MANILA. 4. CHURCH AT ALBAY, ALBAY. 5. FORTIFIED CHURCH AT BOAC, MARINDUQUE. 6. DE LOMA CHURCH, MANILA.



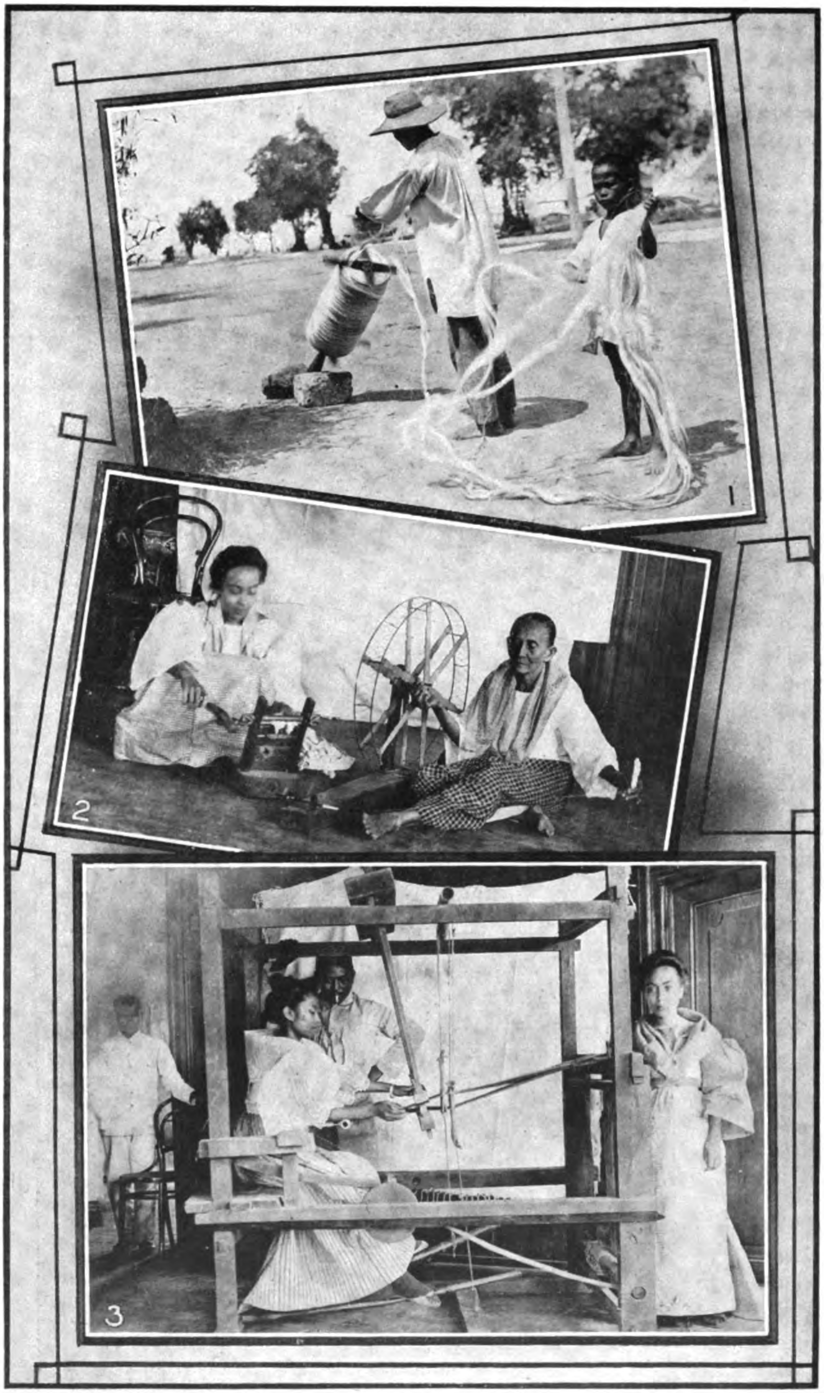
1, 2. TOBACCO FIELDS, PROVINCES OF CAGAYÁN AND ISABELA. 3. TOBACCO LEAVES ARRANGED IN "HANDS" FOR CURING. 4. SUGAR CANE, SHOWING THE LUXURIOUS GROWTH. 5. CRUDE METHOD OF EXTRACTING THE JUICE OF THE SUGAR CANE. 6. TEOSINTE, OR FORAGE PLANT, RECENTLY INTRODUCED INTO THE PHILIPPINES BY THE BUREAU OF AGRICULTURE, MANILA.



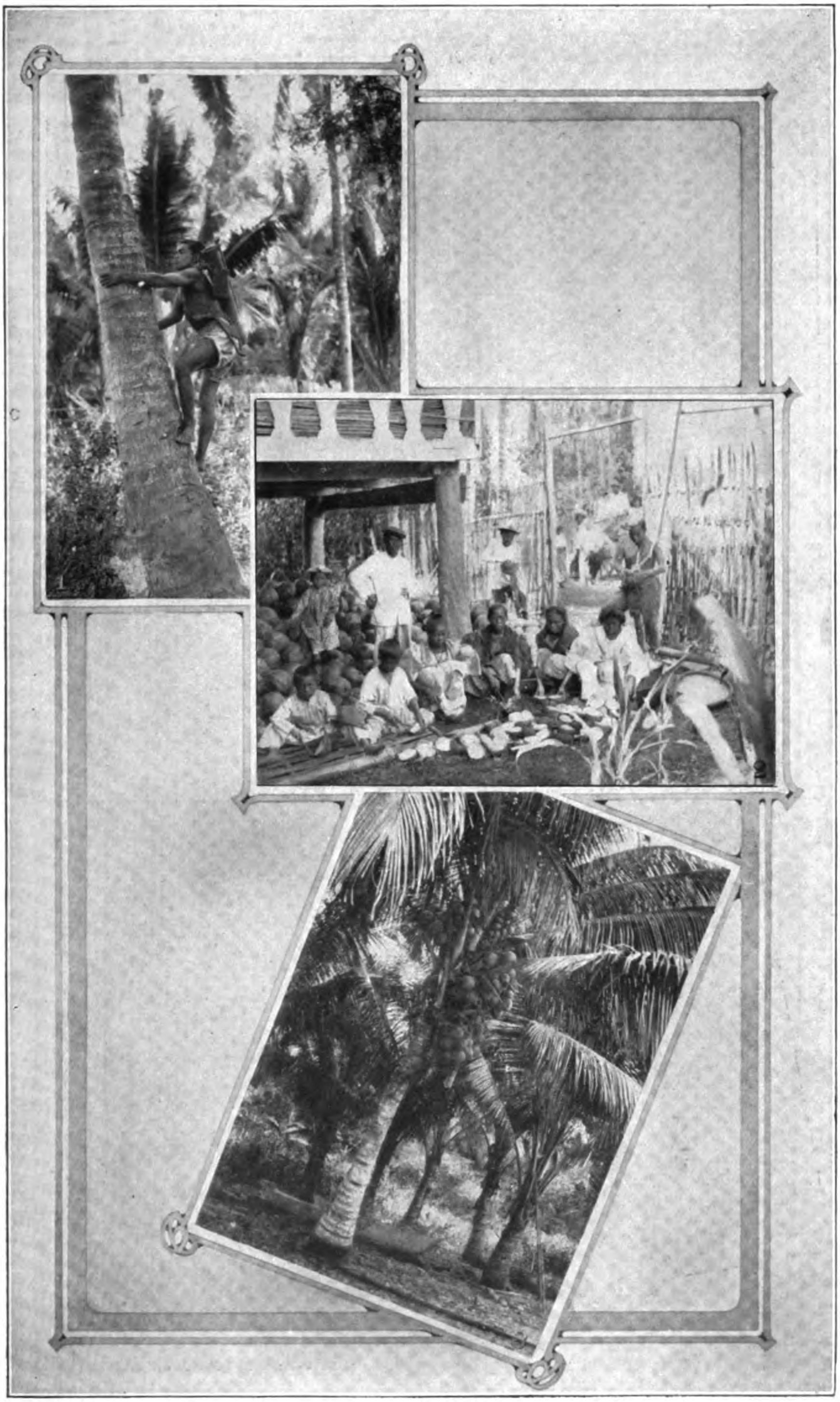
1. TUNNELS ON GOLD QUARTZ VEINS, BENGUET PROVINCE, LUZÓN. 2. BLACKSMITH SHOP. 3. SALTMAKING.



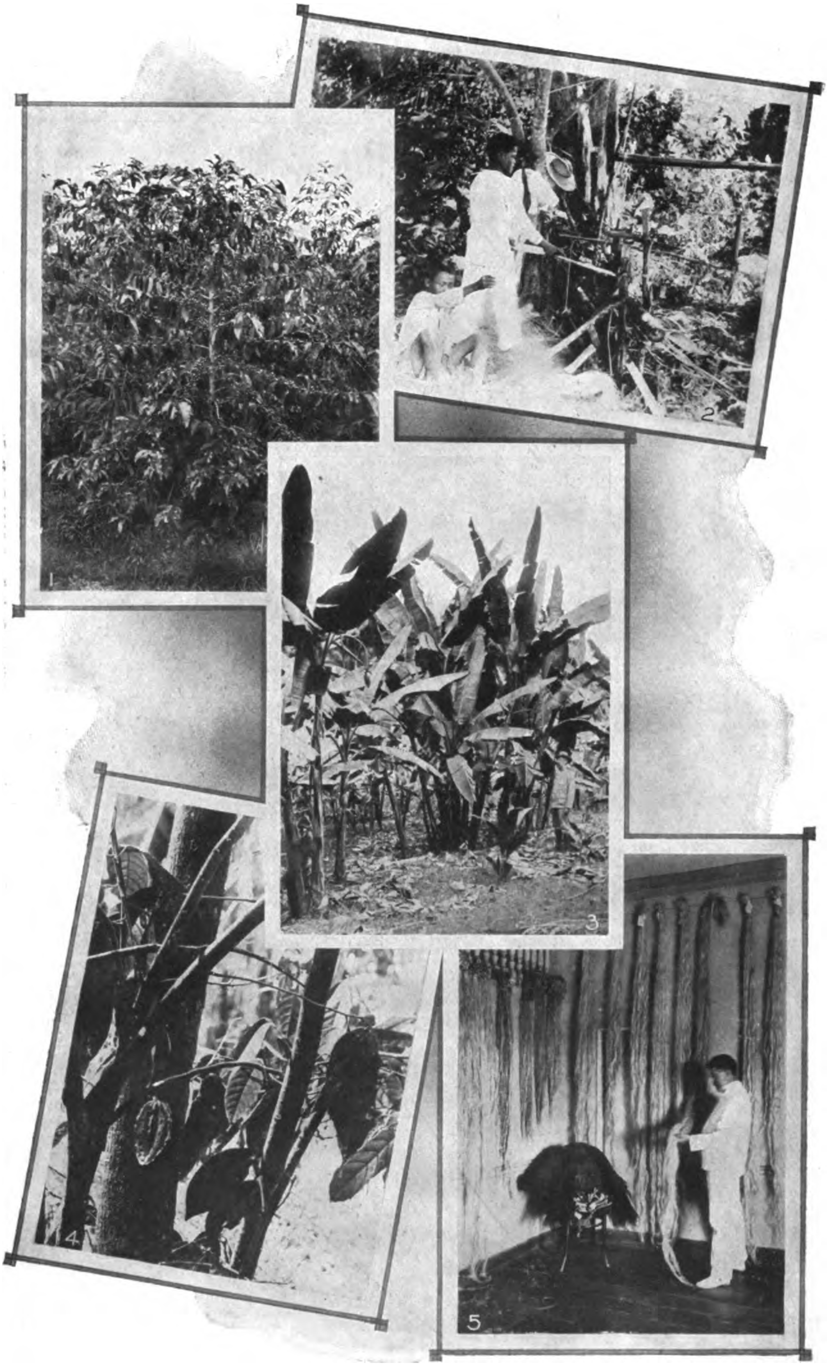
1. THRESHING RICE BY BEATING SHEAVES ON STONES. 2. MILL FOR WINNOWING RICE BY HAND. 3. HULLING RICE IN WOODEN MORTAR WITH WOODEN PESTLES. 4. PLANTING RICE. 5. HULLING RICE.



1. FILIPINOS MAKING ROPE. 2. ILOCANOS SPINNING COTTON, LUZÓN. 3. PRIMITIVE LOOM OF THE ILOCANOS, LUZÓN.



1. CLIMBING THE COCONUT PALM FOR TUBA. 2. HUSKING AND SPLITTING COCONUTS FOR COPRA.
3. COCONUT TREE AND FRUIT.



1. COLLECTION OF DEAN C. WORCESTER.

1. COFFEE PLANT, SHOWING THE REMARKABLE LUXURIANCE OF THE GROWTH. 2. STRIPPING ABACÁ (HEMP). 3. THE ABACÁ, OR "MANILA HEMP," PLANT. 4. CACAO TREE, SHOWING FRUIT AT MATURITY. 5. FINE SAMPLES OF MANILA HEMP, BUREAU OF AGRICULTURE, MANILA.

this indicates that, although the proportion of population under 20 is unusually large in the Philippines, large families are not as numerous there as in other countries.

PROPORTION OF BABIES

The population under 1 year of age numbered 167,905. This was 2.4 per cent of the total population. For comparison we have a similar proportion in Porto Rico of 2.7 per cent; in the United States, 2.5 per cent, and in Cuba, 1.5 per cent. The low proportion in Cuba was supposed to be due to the disturbed conditions in the island prior to the taking of the census. Similar causes doubtless accounted for the small proportion of this class in the Philippines.

The children under 5 years numbered 1,054,096, which was 15.1 per cent of the total population. The same class in the United States formed 12.1 per cent; in Porto Rico, 15.8 per cent, and in Cuba, 8.3 per cent.

The number under 10 years of age was 2,014,160, or 28.8 per cent of the total population. The same class in the United States formed 23.8 per cent; in Porto Rico, 30.9 per cent, and in Cuba, 22.7 per cent.

The number of children between 5 and 17—that is, of school age—was 2,137,397, or 30.6 per cent of the population. The proportion of school children in Porto Rico was 32.8 per cent, a little greater, while, on the other hand, that in the United States was 28.3 per cent, or slightly less.

PROPORTION OF ADULTS

Persons between 20 and 29 were in smaller proportions in the Philippines than in either the United States, Cuba, or Porto Rico. Between 30 and 39 years, 40 and 49, and 50 and 59 there were larger proportions in the Philippine Islands than in Porto Rico, but smaller proportions than in either the United States or Cuba. Between 60 and 69 the proportion was greater than in Cuba or in Porto Rico, but less than in the United States. Between 80 and 89 and at more advanced ages the proportions in the Philippine Islands exceeded those of either of the three countries used in comparison.

In the Philippine Islands no fewer than 3,553 persons were reported as being more than 100 years of age. It is not probable that a Filipino ever reached that age, or that many have exceeded the age of 80 years. To test the question, several hundred of these cases of reported great age were returned to the supervisors of the census with instructions to have the cases investigated thoroughly, and, if possible, the ages verified by reference to the baptismal certificates. Owing to the destruction of records during the recent insurrection, it was possible to obtain this evidence in only a very few cases, but in every such case the reported age was reduced greatly. The average reduction in all such cases was from 106 years to 83 years—that is to say, the true age was about four-fifths the reported age.

THE MARRIED STATE

Of the total male population of the Philippines 58.6 per cent were reported as single, and of the female 54.1 per cent. These proportions also were slightly less than in the United States, which were for males 60.6 per cent and for females 55.1 per cent.

As in Cuba and Porto Rico, the married may be divided into two classes, those legally married and those living together by mutual consent, or, as they will be spoken of hereafter, consensually married. The legally married numbered 2,314,583, constituting 33.1 per cent of the entire population, a proportion somewhat less than the United States, where it was 36.5 per cent. It formed a strong contrast with the proportion in Cuba, which was only 15.7 per cent, or less than half as great a proportion. The number consensually married was 233,670, forming only 3.3 per cent of the population. This class was in the Philippines much smaller proportionally than in Cuba, where it formed no less than 8.4 per cent of the population. Adding together the legally and consensually married, the proportion of all married persons in the Philippines became 36.4 per cent of the population, or about the same as in the United States, while in Cuba the legally and consensually married together formed only 24.1 per cent of the population.

The proportion of married in the Philippines, including those legally and consensually united, is greater than in Japan, Germany, Austria, Canada, Mexico, Switzerland, United Kingdom, Argentina, Cuba, and Porto Rico, but less than in British India, where infant marriages are so prevalent, and in the United States. It is rather extraordinary that seven-tenths of all the prostitutes reported in the islands were from foreign lands, which speaks volumes for the chastity of the Filipinos.

THE WORKERS

The occupations of the Filipinos are few in number and present little variety. There is little coöperative work, very little use of machines, and little specialization of function. A majority of the male Filipinos farm on a small scale, those living near the coast alternating that occupation with fishing. Most of the women who were returned as having occupations were spinners and weavers, weaving in their homes on hand looms the beautiful, delicate *jusi*, *pina*, and *sinamay*. They weave also hats and mats of the finest quality, all this work being done in a small way as a household occupation, alternating with the duties of housekeeping.

With this introduction the reader will be prepared for the statement that a large proportion of the people, much larger than in the United States or in almost any other country, were reported as engaged in gainful occupations. Indeed, out of a civilized population of 6,987,686 in the Philippine Islands no less than 3,037,880, or 43.5 per cent, were in this class, as compared with 36.3 per cent in the United States, 33.1 per cent in Porto Rico, and 39.6 per cent in Cuba.

THE SURPRISING NUMBER OF WOMEN WORKERS

This excessive proportion was, however, due to the large number of women workers, namely 1,025,287, as is shown by the following table, in which the proportions of wage-earners among the males and the females are given for the above four countries:

Country.	Male.	Female.
Philippine Islands.........	57.6	29.4
United States..	58.7	12.8
Porto Rico	56.9	9.9
Cuba.	68.2	8.8

From the above table it appears that the proportion of women engaged in gainful occupations in the Philippines was more than double that of the United States, three times that of Porto Rico, and more than three times that of Cuba, while the proportion of working males was about equal to that in the United States and Porto Rico and less than in Cuba.

This remarkable showing is in part explained by the fact that a large proportion of the women assist in supplying the family exchequer by spinning and weaving and to a less extent by working in the fields.

Persons not engaged in gainful occupations include women engaged in housework, children at school, and other dependents.

Farmers and farm laborers constitute more than two-fifths of all who are engaged in gainful occupations. A much smaller proportion are engaged in manufacturing and mechanical pursuits, while the number in professional service is exceedingly small, forming less than one per cent of the entire number gainfully employed.

Among the Filipinos themselves there are 1,326 physicians, 676 priests, and 727 lawyers. Nearly one-half of the Chinese wage-earners are merchants or salesmen. Of the foreign or white population a small proportion is engaged in agriculture, but most of them are found in the trades and professions.

The following table shows the proportion of the wage-earners in each age group to the total population, and with it, for comparison, corresponding figures from the census of 1899 for Cuba and Porto Rico.

Age period.	Philippine Islands.	Cuba.	Porto Rico.
10 to 14 years	16.8	24.6	22.4
15 to 24 years	66.9	52.5	51.8
25 to 34 years	72.4	58.5	54.3
35 to 44 years	74.3	60.4	56.9
45 to 54 years	72.5	60.3	55.4
55 to 64 years	65.8	59.5	53.2
65 years and over	42.7	52.0	44.5

EXCESS OF BIRTHS OVER DEATHS IS LARGE

The average excess of births over deaths in the Philippine Islands for the last 25 years is 8.8 per thousand, but excluding the cholera years (1879, 1889, and 1890), when the death rate exceeded the birth rate, it was 17 per thousand per year. This is higher than that of the United Kingdom, Sweden, Norway, Japan, Italy, and Germany, but slightly less than that of the United States. It is many times that of France and Ireland and double that of Switzerland. Yet with this great excess of births over deaths, the population has not increased rapidly. It has taken nearly sixty years to double in number, and is now only four times as great as at the beginning of the century, while in that time the population of the United States has multiplied fifteen times. The cause for this is the epidemics, such as cholera, plague, and smallpox, especially the first, which periodically sweep over the islands and in a single year wipe out the gains of the preceding two or three years. So the population has grown by a series of regular and rather rapid accretions, succeeded by sudden and great losses. Thus the cholera epidemic of 1879 must have destroyed 400,000 lives, equivalent, approximately, to the normal increase in three years. The cholera epidemic of 1889 and 1890 was not so severe, its victims numbering in the two years about 260,000, while that of the year 1902 must have destroyed over 200,000 people.

The death rate for the year 1902, 63.3 per thousand, was just about double the normal, and was in large part due to the prevalence of cholera. Other things, such as the loss of crops through locusts, the loss of carabao, and the after effects of the insurrection, by which the constitutions of those affected by it were undermined, through hardship, exposure, and want of food, probably contributed.

THE CAUSE OF DEATH

The smallest proportion of deaths occurred in the cool season (November to February). In the warm season (March to June) there occurred 28.4 per cent, and in the wet season (July to October) not less than 47.1 per cent.

Of all the deaths that occurred in the Philippine Islands in the year 1902, 311 out of every thousand, or nearly one-third, were caused by Asiatic cholera. The large death rate from this source may be regarded as extraordinary. It was not so, however, with the fatality from malarial fevers, which are always prevalent in the islands, and probably little more so during this year than in preceding years. The deaths from this cause constituted 26.8 per cent of all the deaths, or somewhat more than one-fourth. These two causes, cholera and malarial fevers, caused nearly three-fifths of all deaths. Dysentery and diarrhea together caused 69 out of each thousand deaths, and was third in rank of fatality. The fourth disease in fatality was tuberculosis, whose victims numbered 66 out of every thousand, and the victims of smallpox, which raged in many parts of the islands during the year, were nearly as numerous, numbering 34 out of each thousand. The victims of beri-beri, a disease which is peculiar to the brown and yellow people, due probably to insufficient nutrition, numbered 13 out of every thousand, and diseases of the stomach caused 12 deaths per thousand. No other disease caused as much as 1 per cent of all the deaths. Puerperal septicemia, bronchitis, typhoid fever, diphtheria, croup, and meningitis each had a few victims, but in each case less than 1 per cent.

CONTRAST WITH THE UNITED STATES

These figures are in strong contrast with those which prevail in the United States. In that country the most fatal of all diseases is commonly tuberculosis, which is usually credited with a little over one-tenth of the deaths. Next to that is pneumonia, in a nearly equal proportion. This latter is well-nigh unknown in the Philippines, its victims numbering in 1902 only one in a thousand of the deaths.

In the United States dysentery and diarrhea together carried off about 4.4 per cent, only two-thirds the proportion in the Philippines, which was 6.9 per cent, while heart disease, which is almost unknown in the Philippines, caused 6.7 per cent of all deaths in the United States. Typhoid fever is vastly more prevalent and deadly in the United States than in the Philippines, its victims numbering 3.4 per cent of all deaths in the United States, while in the archipelago the number was trifling. It is much the same with meningitis, which in the United States carried off 2.5 per cent. Malarial fevers, prevalent as they are in some parts of the United States, are seldom fatal there, only 1.4 per cent of all the deaths being due to this cause. Kidney diseases, old age, apoplexy, and many other diseases which claim numerous victims in the United States were either unknown in the Philippines or claimed very few victims.

THE AVERAGE FILIPINO FARM IS VERY SMALL

Nearly half the parcels of occupied lands are less than one hectar (2.471 acres) in size, while thousands of tracts, one-fifth of the total number, contain less than 1,075 square feet. These small parcels of land, many of them no larger than ordinary kitchen gardens in the United States, are resided upon by, cultivated by, and contribute materially to the subsistence of their owners or occupants, and the presentation of agricultural statistics for the Philippines would be extremely faulty and incomplete were they not included.

The people of the Philippines are extremely gregarious; the isolated farmhouse, so familiar in rural sections throughout the United States, is practically unknown in these islands, whose inhabitants almost universally live in communities and largely subsist on such products of the soil as can be cultivated or gathered from wild growths in the immediate vicinity of their dwelling places.

This custom of herding together is not due alone to the social, company-loving disposition of the people. It has been rendered necessary by the ladronism and the raids of Moros that prevailed throughout the islands for centuries.

This has been one of the greatest obstacles in the way of agricultural development and is in a large degree the cause of the numerous small land holdings. Another reason is the great productiveness of the soil and the variety of crops that can be raised on a small piece of land.

The average size of all farms in the Philippines is only 346.8 ares—equivalent to 8.57 acres. In the United States the average size of all farms is shown by the census of 1900 to have been 146.6 acres, making a ratio as to size of about 17 to 1.

VAST EXTENT OF UNUSED LAND

The spaces of land between their villages are as a rule unpopulated, and these intervening tracts, frequently of great extent, are almost wholly uncultivated and practically unused, except in a limited way for grazing purposes or in the utilization of such wild growths of fruits, vegetables, or fiber plants as they produce.

MOST OF THE FARMERS OWN THE LAND

In the archipelago, as a whole, by far the largest proportion of the 815,453 Christian farmers own the land they cultivate, while tenants who pay a share of products as rental come next in order numerically; tenants who pay their rent in cash, while not comparatively numerous, exceed the combined numbers of those who are designated as "labor tenants" and the occupants of land who pay no rent.

A comparison of the Philippine statistics relating to tenure with those given in the United States census reports for 1900 shows that the percentage of owners is much larger in the islands than in the United States.

More than four-fifths (80.8 per cent) of Philippine farms are cultivated by their owners. The great majority of individual holdings, regardless of tenure, are of small areas—88.9 per cent containing less than 5 hectares, 70.4 per cent less than 2, 49.8 per cent less than 1, and 21.7 per cent less than 0.35 of a hectare.

PAUPERISM UNKNOWN

Pauperism is almost unknown among the people of the islands, their wants being few and easily supplied. Little clothing is required, and the simple food upon which the masses of the people subsist, consisting mainly of rice, fruit, and fish, can, as a rule, be had with little exertion. The few who, from old age or accident, are unable to provide these necessaries for themselves are usually taken care of by relatives or friends.

The total number of paupers in the archipelago, exclusive of Manila, on December 31, 1902, was but 478, or less than 1 in each 10,000 of the inhabitants. This may be contrasted with the corresponding proportion in the United States, *viz*, 12 per 10,000.

PROPORTION OF CRIMINALS SMALL

The number of criminals in confinement December 31, 1902, in the Philippines was less than 8 in each 10,000 of population. In the United States in 1890 there were about 13 in each 10,000 of the inhabitants. Considering the unsettled condition of affairs in the island during the six years prior to the census, the showing is not only favorable, but remarkable, and indicates that the Filipinos as a race are not especially disposed toward crime.

The most common crimes are ladronism, theft, assault, and murder. The causes are traceable to the ravages of the war, to the poverty and unrest which followed, accentuated by the subsequent failure of crops and loss of farm animals. In the majority of the provinces crime is said to be decreasing.

In most of the provinces reporting, the convicts are employed on public work, such as the building and repairing of roads and bridges. In a few of the provinces it has not been found expedient to do this, and they are employed in the prison in petty manufactures, such as making chairs, baskets, hats, rope, etc.

THEY ARE PROVING THEMSELVES GOOD WORKMEN

A report made to Governor Taft November 4, 1902, by J. B. Aleshire, major and quartermaster, United States Army, in charge of army transport service at Manila, clearly demonstrates the availability of native labor and strongly refutes the frequently expressed idea that such labor cannot be profitably employed. His report shows that upward of 1,800 Filipino laborers, skilled and unskilled, were on the pay-rolls of the Quartermaster's Department, a large proportion of whom were given regular and almost continuous employment. About 450 of the employees were engaged as launch and lighter officers and crews and were rated as unskilled, having been principally engaged in the handling of coal, freight, baggage, forage, etc.

Major Aleshire says:

"Chinese labor was formerly employed for the handling of coal, but has been abandoned and replaced by Filipino labor, which by practical tests during several months averaged more tons per day per man and at a much lower rate per ton.

"The attendance of the Filipino laborer has been and is excellent. They do not absent themselves after Sundays, holidays, or fiestas, nor during such days should they be notified in advance they will be required to work. Their physical strength is much improved, and they are capable of doing as much and as hard work as any laborer we have in the orient."

Governor Taft, in referring to the labor question in an address at Manila, said:

"I know the disposition of most Americans here is to open the doors and let in the Chinese, so that we may have Chinese cheap labor in the islands, but I am emphatically opposed to the general policy of admitting the Chinese, first, because the Filipinos have the strongest opinion that it will be for their detriment, and, second, because I believe the history of the Straits Settlements shows that it will not be for their prosperity as distinguished from the material prosperity of the islands. I am opposed to admitting any Chinese labor until it shall be made to appear that the great works of construction which are essential in the islands cannot be carried on satisfactorily with Filipino labor."

The rates of wages which have prevailed since American occupation, while low as compared with wages in the United States, have been substantially double those paid under Spanish dominion.

THE FILIPINO IS A NATURAL-BORN FISHERMAN

Fish forms one of the principal items of food of the Filipino people, and a large proportion of the people are fishermen.

Fish are caught by various devices. In favorable situations the shores are lined in the shallow waters with traps, weirs, or corrals built of bamboo, and in them a large part of the catch is made. Nets and seines of various patterns are also extensively used, as well as the ordinary hook and line, and in some localities the spear.

The markets of Manila are always bountifully supplied with fresh fish of many varieties and of fine flavor, and the fisheries in the vicinity which supply the city are said to be highly remunerative. The same is true at other centers of population throughout the Philippines.

It appears from the statements of the supervisors that about nine-tenths of the people of the islands use fish as their principal flesh diet. The average family consumes in the neighborhood of 800 pounds of fish per annum.

The total annual consumption of fish in the islands approximates half a million long tons. In this industry there are employed, during a part or all of their time, the estimated number of 119,000 persons and 28,000 boats.

PEARL FISHERIES

Fishing for mother-of-pearl shells, and incidentally for pearls, is carried on to some extent in the waters of the Sulu archipelago. The instruments used in this industry are, for the most part, crude and of small effectiveness, though there are a few shell-fishing outfits equipped with modern diving apparatus—helmet, waterproof suit, pump, etc. The shells are plentiful and valuable, and pearls are frequently found, sometimes very fine ones of high value. The industry is said to be extremely profitable, and is believed to be capable of great enlargement. The investment of comparatively small capital will, it is said, yield large returns under intelligent and businesslike management.

Captain H. R. Hickock, United States Army, the supervisor of census for the district of Siassi, gives the following interesting account of Moro fishing for sharks, sea worms, shells, and pearls in the southern seas:

"All of the Moros are fishermen to a greater or less extent. Shark fishing is done by trolling in deep water with about 40 or 50 feet of line. After a shark is hooked he is first tired out and then drawn up to the boat and killed with a spear. The tails and fins are then cut off and traded to the Chinos, by whom they are then shipped to China.

"The tail and fins of a shark will average about 10 pounds in weight. The Chino traders recognize two grades of this article, for which they pay 45 and 125 pesos respectively per picul of 137 pounds.

"Sea worms, which are muscular, gelatinous animals, living attached to rocks at a depth of water of 6, 8, or 10 feet, are also secured by the Moros and sold to the Chinos, who recognize ten classes, for which they pay from 8 to 80 pesos per picul."

PHILIPPINE TRADE

Philippine trade was opened to the world in 1834. The value of imports for 1902 was $33,342.166, of exports $28,671,904. Commerce with foreign countries is carried on mostly in vessels bearing the British and German flags. The number of ports and subports open to commerce has trebled since American occupation began.

OTHER NOTABLE FEATURES OF THE CENSUS REPORT

The preceding pages give a summary of the more important geographic information contained in the Census Report, being drawn principally from the introduction by General Sanger, and from the chapters on Geography, Population, and Mortality by Mr Henry Gannett.

The report contains two important chapters describing the characteristics of the civilized and non-civilized tribes. Every supervisor was instructed to make special note and record of the customs, character, and life of the people with whom he was brought in contact. The principal parts of these reports are published, supplemented by extracts from the speeches of Governor Taft and travelers in the islands, so that for the first time we have a very complete and comprehensive description of every tribe.

The following chapters also are specially important: The History of the Islands, by a member of the Philippine Commission, T. H. Pardo de Tavera, which is the first good history of the Filipinos that has been written and published in the English language by a Filipino; The Judiciary, by Chief Justice C. S. Arrelano and Assistant Justice Torres; Population, by David P. Barrows; Mr Barrows, as a result of his special study of the people, has greatly reduced the number of tribes into which the Filipinos are usually divided; the admirable discussion of the Climate of the Philippines, by José Algué, Director of the Philippine Weather Bureau, and of the Volcanoes and Seismic Centers, by M. Saderro Maso, Assistant Director of the Philippine Weather Bureau; and a series of articles on the agricultural products and possibilities of the Philippines.

Another valuable feature of the report is the large number of colored maps and diagrams which picture in graphic form the facts obtained by the census. Among these may be mentioned a colored map of the Philippines, 21 by 32 inches; a contour map; maps showing the distribution of forests; the mean annual temperature; the mean annual rainfall, which shows that the rainfall on the eastern coast is more than double what it is on the western coast; the density of population; the distribution of civilized and wild tribes. This map is particularly valuable, as it is the first attempt to show the geographic distribution of the eight civilized tribes and the sixteen wild tribes; the areas invaded by cholera in 1902 and 1903; the distribution of tobacco, cotton, copra, etc.

Mr W. S. Rossiter, who designed the typography and arranged the illustrations, merits public congratulations for the exceeding good taste and artistic appearance of the volumes. He has introduced an innovation into government publications. The Philippine reports are bound in brown buckram, stamped in silver, and bear the seal of the Insular government. They are printed in handsome type, on laid antique paper, and the illustrations are well grouped and beautifully printed. Consequently the volumes do not wear that ugly, forbidding aspect which makes the usual government publication, however worthy, sink into speedy oblivion. It does not cost any more to publish reports in an attractive and presentable form, and it is far more satisfactory to the public and but justice to the author. It is unfortunate the edition of the work is so small, for every public and school library in the United States ought to have at least one set.

GILBERT H. GROSVENOR.

COMMANDER PEARY'S NEW VESSEL

THE steamship which has been especially built for Commander Peary's Arctic expedition was launched on March 23. Mr Peary appropriately named her *Roosevelt*, in acknowledgment of the great interest taken by the President in polar work.

The vessel is described as a "three-masted fore-and-aft schooner-rigged steamship, with auxiliary sail power." Her principal dimensions are: Length over all, 182 feet; beam, 35.5 feet; depth, 16.3 feet; mean draft with stores, 17 feet; gross tonnage, 614 tons, and estimated displacement about 1,500. Her model is similar to modern-built steam whalers, but rather more sharp, the particular features being her long, high, raking bow, overhanging stern, and general wedge shape at the sides, in order that she may be lifted free if nipped in the ice.

The steamship was built of white oak, the frames being treble and close together, with double planking, making the walls from 24 to 30 inches thick. The keel is 16 inches thick, but false keels and keelsons form a backbone projecting 6 feet under the entire length of the vessel. The bow is backed by 12 feet of solid dead wood. Her engine and boilers will develop 1,000 to 1,500 horse-power. Her cost when ready for sea will be $100,000. The funds for the vessel's construction were supplied by the Peary Arctic Club of New York.

SOME LESSONS IN GEOGRAPHY

BY EDWARD ATKINSON

AT the request of the Secretary I will venture to give the reasons why I have made an exception to my recent rule of avoiding any new responsibility on account of advancing age, and have joined the National Geographic Society. In giving my reasons for this exception and my sense of the importance of this organization I must of necessity give my personal experience, or a part of what the artist, Chester Harding, called his reminiscences—a chapter from my "egotistigraphy."

When I left school, in 1842, to begin work in a commission house for the sale of textile fabrics I had received the ordinary instruction in geography by learning lessons out of Worcester's school book. After serving the customary apprenticeship of those days, before porters and janitors were employed to do the heavy work, I happened to enter the counting-room of the treasurer of a cotton factory, where I began a course of business life, which has kept me in more or less intimate relations with the cotton manufacture from 1848 to the present time.

It had been my practice as a youth to get at the underlying facts in regard to any pursuit to which my attention had been called. Therefore when I found that my business life might be occupied in the cotton manufacture, perhaps permanently, I put to myself the question, "What is cotton? Why and how does it spin? Where is the center of production?" and so on.

On putting these questions to my elder associates I could get but little information. The common impression among the cotton manufacturers of New England was that cotton was a tropical plant that could only be cultivated by negroes; that the cotton states were substantially tropical states, where white men could not work in the field, and that when the crop was being gathered the whole area of the cotton states would resemble the North under a snow storm—white with the maturing cotton.

This impression had been vigorously promoted by the slave-holding interests and led later to the opposition of what were known at the time as the "Cotton Whigs" to any efforts to remove the curse of slavery.

I then supposed, as all my associates appeared to, that the reason why cotton could be spun was that it was barbed or bearded like rye, and that these barbs interlocked in making the thread—a totally erroneous conception.

Not being satisfied with these conditions, I began my own researches. I procured books from the libraries and strained a point to buy some books of importance from my rather meager earnings. I found it necessary to comprehend the physical geography, the geology, the climatology, and the chemistry of the soils of all the cotton-producing countries; the chemistry of the plant, and the social conditions of each cotton-producing section. Of course, this was a matter of long, tedious, and often misdirected study; but in the end I had attained a considerable amount of geographical knowledge. In fact, it may be said that when one picks out a lock of cotton from the boll in the cotton field, twists it with his fingers, and, doubling with the teeth, makes a strong cord without the aid of any mechanism, he may find in his imagination his counterpart in the Aryan woman of prehistoric time, who, taking a lock of cotton from the boll in India and going through with the same process, made the first piece of cotton cord; and then as he untwists that strand or follows its convolutions from one end of the cord to the other, by which the ages are united, he will find twisted into it the whole of human history, all the physical sciences, and the record of the progress in illfare and in welfare which has accompanied the cotton manufacture to the present time.

I may not enter into any minute statement of this long period of investigation. Suffice it that I learned how futile must be the effort of every tropical country and of almost all the semi-tropical countries to compete in the production of the useful cottons of commerce with the cotton states of America, there being only one exception developed by my geographical studies. From Commodore Paige's explorations on the Paraguay and Parana rivers, subsequently sustained by Charles Darwin's explorations, I became convinced that the only considerable area of the earth's surface where a well-trained, well-bred, and well-governed population could compete with us was on the great pampas of the Argentine and of Bolivia, which, rising in altitude as they approach the equator, represent a huge area of the most fertile land which can compete in wheat and in cotton with the United States, but now forming a part of what I call "the lost continent of South America," still waiting for good government and the immigration of Germans, Italians, Hebrews, and other industrious and energetic races, by whom that great continent may hereafter be developed.

Having thus come to a clear comprehension of the absolute necessity of a complete mastery of what may be called commercial geography, geology, and climatology, I made an effort, being one of the directors of the Massachusetts Institute of Technology, to induce the corporation to establish a department of instruction on these lines. I had made an investigation of the department which existed in the University of Edinburgh. I investigated as well as I could the courses of instruction given in Germany and in Austria, and I found that we were then, as we are now, years behind these states, and to them we may now add Japan, where complete departments of instruction on these lines are well established.

The other day a professor of the Department of Commercial Geography in one of the great schools in Japan called upon me to make certain inquiries in regard to specific industries, that he might investigate them and find out why they had centered at particular points in this country. I then learned that he had been sent here by the government of Japan two years since, studying the geography, geology, and the climatology of every part of this country.

But I failed in my effort to get such a course established twenty-five or thirty years ago. Today there is general interest in the subject, and it will not be long before every principal university and technical school will have such an established course.

I have made similar investigations in regard to wool, flax, hemp, silk, and other fibers, and the amazing thing to myself has been the ignorance of the great mass of the dealers and handlers of these fibers in respect to the very A B C of their production and the conditions which have centered them at different points of the globe.

Were I not an old man, still burdened with many duties, I should feel inclined to take up a line of work which some bright investigator may well assume, namely, to write a treatise or book on the "Natural History of Industries." Why have the various branches of manufacture of this country centered themselves around special points, not always single points, but here and there throughout the country? Such investigations would of necessity compel the study of commercial geography, as my own effort to comprehend the cotton plant has not yet ended, and every day some new fact is developed on this line. Education never ends and never will.

What have been the lessons yet to be applied in the cotton states of America? They are these: The invention of the cotton gin brought the curse of cotton upon the old cotton states, perpetuating slavery for nearly a century, when otherwise its burden might have been peacefully removed by economic forces. It has led to the devastation of the cotton lands, maintained ignorance and illiteracy, retarded intellectual and industrial progress down to even the last few years. As I once said in a great meeting in Georgia, "If the North, having discovered that it was building up a dangerous competition in the arts of which it holds the control, should come down with all its force upon the South to put back the burden of slavery upon you, you would fight longer and more strenuously to keep it off than you ever fought to maintain it, and you would secure your own liberty and the emancipation of every person, white or colored, by force of arms, if that were necessary."

Now, what have been the sequelæ of slavery? As yet the masses of the cotton-growers have little comprehension of the conditions of climate and soil on which they raise their crops. The greatest progress has been made in the Agricultural Department in making the production of cotton an applied science, but as yet it is not widely practiced. When common sense and a small measure of intelligence shall be applied to the existing cotton fields of the South, the crop may be doubled without the addition of a single acre to the area put under the plow, and when the right types of sheep are bred to meet the conditions of the soil and the climates of the upland cotton district on the Piedmont plateau and of the valleys among the hills, each section may be supplied with its own specific breed, as every county in England and Scotland now is. The sheep folded and fed upon the partially exhausted cotton lands, the crop will be doubled. Add the wool clip and make that great Piedmont plateau the center of the fine-wool production of the world, as the cotton states have become the center of the cotton production of the world.

Such is the picture which is brought before my mind by your undertaking to establish a national geographical society, and it is under this influence that I have joined one more society, while withdrawing from many others in which I have heretofore been interested.

One lesson I learned from this investigation, leading me to conclusions which may not be so acceptable to readers at the present time as they would be if each master of any branch of industry would study for himself the geography, geology, and climatology on which his own branch of industry rests.

I learned certain principles of economic science—a principle being "a rule of action, a maxim, an admitted truth requiring no further demonstration," in that respect differing from a policy. I learned to discriminate between the principle of free trade and the policy of protection in which I had been bred and to which the very large majority of my business associates then adhered, that majority having been gradually changed until the balance is nearly the other way, even in the restricted lines of my associates.

I learned what I venture to state as another principle of economic science, namely, high wages in money or what money will buy are the complement or correlative of low cost of labor in the unit of product in every branch of industry that has passed beyond that of being a mere handicraft. In the handicrafts the rate of wages governs or corresponds to the cost of labor in the unit of product, but in the arts to which science, invention, and mechanism have been applied the cost of labor in the unit of product is diminished in just proportion to the advance in the rate of wages that are secured by those who become skilled in the conduct of the work. It therefore became manifest to me, as it is now becoming manifest to the great mass of the people of this country, that the fear of foreign so-called pauper labor, by which destructive duties on imports have been chiefly maintained, is foolish. We are surely learning that we have relatively the cheapest labor in the world, for which the highest relative wages are paid.

I learned that, with the exception of a very few of the crude products of the tropics and with the exception of a very few arts, like the manufacture of Brussels lace and other similar luxuries which are produced by hand labor at the level of pauper wages, we might hold paramount control. I became convinced that just so fast and so far as our system of collecting revenue from duties on imports could be limited to the least number of articles and collected only for revenue purposes would the manufactures, mechanics, arts, and agriculture of this country be most fully protected, the development of domestic industry most fully assured, and the imperial control of commerce, which of right rests with us on account of our control of the imperial metal, iron, would be fully assured.

I now recognize with much satisfaction that I have lived long enough to witness this true theory of wages and the source of profits generally accepted by men of affairs of this country, and I may live long enough to see this country take its true place as the paramount power among the nations by becoming the greatest example of the free exchange of product for product and service for service with all the states and nations of the world. The same study of geography and other factors in the production of fibers might lead others to a different conclusion. I am only giving my own egotistigraphy.

And now, having read the foregoing, I must yet add a few more thoughts, even at the risk of going beyond the limit of the space that you can assign to me. One great benefit from the organization of this Society may be that we may no longer be compelled to go to Germany for the best maps and commercial atlases of the world; that we may not be compelled to go to England for the only commercial geography of any merit in the English language, but may secure such improvements in our own school atlases that the instruction in geography will be something more than memoizing, as it used to be in my day, and something more in the line of a true education than I believe it now is.

Yet again, in witness of the importance of true knowledge of commercial geology and geography, let it be remembered that the great developments of science in the manufacture of iron, in the application of steam power, preceded only by a few years the great Napoleonic wars, giving to England the power to develop mechanism and manufactures to carry on that great war, developing her commerce and increasing her wealth even during that long struggle.

And, again, let it be borne in mind that the whole basis of the modern industrial development of Germany rests upon the invention of two Englishmen, Gilchrist and Thomas, by whom the manufacture of basic steel was made possible from the phosphoric ores in Germany, thus enabling Germany to rival England in the development of mechanism and manufacturing arts and to take a position equal to Great Britain in the production of iron and steel. These two remained dominant forces until through the development of the yet greater deposits of iron and coal of the United States we were enabled to take the dominant position in the production of the imperial metal, which lies at the foundation of all the industrial arts and of the great commerce of the world, placing us where we are now in the production of iron and steel, more than equal to Great Britain and Germany combined, nearly half the product of the whole world. Had it not been for the excess in the price of iron and steel, which the duties on imports enabled the iron masters of this country to charge by a far heavier price to our consumers than the prices charged in Great Britain and Germany, we might long since have assumed the paramount position which we are now rapidly attaining in the export of the higher products of iron and steel, the machinery, the tools, and the fabrics that give employment to ten skilled mechanics where the mere production of the crude metal gives occupation to one or two, being a small relative force in point of number, mostly common laborers.

Again, the time has come when the forces of commerce are being summoned to the suppression of the brute element in man, from which war and warfare are generated. Commerce demands peace, order, and industry. The manufacturers, the merchants, and the bankers hold paramount power when they choose to use it, and when they refuse the supplies that are wasted upon war and warfare, the end—peace on earth—may be within their power. Now they are coming up to demand that the ferry-ways of commerce upon the high seas shall be neutralized, and that the "ships that pass from this land to that, weaving the web of concord among the nations," shall no longer be subject to destruction at the will of a belligerent whose only duty is to destroy commercial vessels. The men of affairs are now combining to establish the rights of neutrals and to stop the nefarious work of commerce destroyers. The mental energy which is developed in the conduct of commerce, requiring powers far higher than those required in the conduct of war, may soon assert its power and bring into living light the vision of peace and good will among men.

In this treatise I have given an account of how I happened to gain a very considerable amount of education in geography through the study of cotton.

Were I a teacher in a school, especially in an evening school where young men and women occupied in the various trades make an effort to continue their education, I would call upon each one to bring to the school an example of one of the leading subjects of trade in which their employers deal. They would bring cotton, wool, flax, hemp, silk, and other fibers, gums, examples of paint and varnish, food products of different kinds, wood, metals, leather, and many other common articles of trade.

I would then take up at a venture one subject—for example, a bit of leather. I would put my questions, "What is this?" The answer would be, "Leather." "What is leather and how is it prepared?" The answer would be, "By tanning." "What is tanning; what is used?" Answers would be few, if any. "How many kinds of leather are there? Where does each kind come from? From what animals? Why do we depend on this or that section for different kinds of leather? Why are these animals fed here and not there? What is the soil? What is the climate? What is the fur or hair? What becomes of it?" and so on. And before the end of the winter's course the simple subject of leather would have extended the thoughts and knowledge of the pupils throughout the world.

Again, another method: Please bring to the next session a statement of what was on your breakfast, dinner, and supper table yesterday, including the cloth, the crockery, the table ware, and every article of food or beverage. These being listed, put the questions, "Where did that table cloth come from? What was it made of? Whence came the spices, the salt, the sugar, the grain, the tea, the coffee, the meats, and everything else upon the tables? How did all these things get upon your table? Who brought them from every corner of the globe? What was the power by which your family set in motion the whole machinery of commerce, of banking, of transportation, to bring to you your breakfast, dinner, and supper?" Answer, "The almighty dollar," provided it is a good dollar, which meets Cernuschi's definition—"That only is good money which is worth as much after the coin is melted or hammered smooth as it purported to be worth in the coin." To that measure of the dollar or dollars each head of a family can command, each family controls the services of all the merchants, tradesmen, bankers, steamship lines, railways, farmers, and manufacturers of the world. The only reason and motive for the existence of all these forces is to supply food, clothing, and shelter to the multitude. All that we get in or out of life in a material sense are our shelter, clothing, and food.

I think that text would develop some lessons in geography. Is not the right end to begin the one which is right at the hand of every youth in the land? Work backward from a single fact relating to any substance, and one may develop, as I did in untwisting the strand of cotton, the geography, geology, climatology, and the chemistry of the soils and conditions of the globe.

THE ZIEGLER POLAR EXPEDITION

MR WILLIAM ZIEGLER is sending north this summer a large party to carry supplies to the Ziegler Polar Expedition. The party will sail from Norway about July 1 on board the *Terra Nova*, a powerful whaling vessel which Mr Ziegler recently purchased for this purpose. Mr W. S. Champ, the general manager of Mr Ziegler's Arctic expeditions, will be in charge. They will try to reach Franz Josef Land, where the Ziegler expedition is expected to meet them. In case the ice is as heavy as it was in 1904, Mr Champ will force the *Terra Nova* as far north as possible, and then allow the vessel to be frozen in. The party will then push across the ice to Franz Josef Land.

The Ziegler North Polar Expedition, which, it will be remembered, set out in 1903, is being made under the auspices of the National Geographic Society, whose personal representative, Mr W. J. Peters, is in charge of the scientific work and second in command. It was expected that the expedition would return in 1904, but the ice was so thick that they could neither get out nor could an auxiliary party reach them. They are abundantly supplied with provisions, and no anxiety is felt on that score.

Mr Ziegler will also send a representative on board the *Belgica*, which is to proceed about July 1 to Shannon Island, on the east coast of Greenland, to make sure that none of the party who made the polar dash have been carried there by the polar drift. Several years ago a large stock of provisions was established at this point in case the men making the polar dash were prevented by the drift from returning to Franz Josef Land and were landed on the Greenland coast.

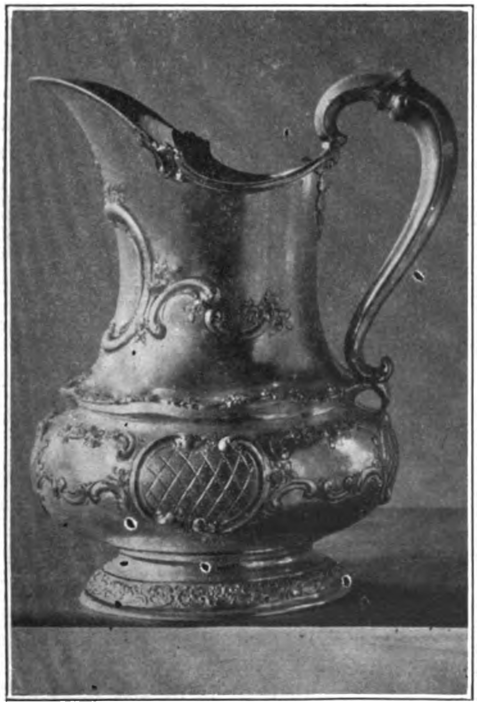
EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS

THE proceedings of the Eighth International Geographic Congress will appear in book form about September 1, forming a volume of about 800 pages. The work is to be published by the United States Government pursuant to the following resolution, which passed the Senate February 21 and the House of Representatives March 3:

Joint resolution (S. R. 109) to print the report of the Eighth International Geographic Congress.

Resolved, etc., That the Public Printer be authorized and directed to print the report of the Eighth International Geographic Congress, held in the United States in September, 1904, the edition to consist of the usual number for the use of the Senate and House of Representatives, and 1,500 copies to be bound for the use of the Eighth International Geographic Congress.

The work is being edited by the Publication Committee, consisting of Henry Gannett, chairman; James Page, and Gilbert H. Grosvenor. All the papers which were presented to the Congress, some 220 in all, will be included, so that the work will be one of the most notable contributions to geographic science that has appeared for some time. A copy of the volume will be sent to every member of the Congress.



On the conclusion of the Eighth International Geographic Congress excursion to Mexico the members of the excursion, wishing to show their appreciation of the many courtesies, time, and trouble freely given by Dr David T. Day, chairman of the Excursion Committee, subscribed to a handsome silver pitcher as a testimonial of their gratitude. The pitcher, designed by Tiffany & Co., has just been completed and was recently presented to Dr Day. A picture of the pitcher is given here in order that the many friends who joined in the presentation and who are now scattered over the five continents may see how their wish has been realized. The seal of the Congress and an appropriate inscription have been engraved on the pitcher.

GEOGRAPHIC LITERATURE

Through Town and Jungle. Fourteen thousand miles awheel among the temples and people of the Indian Plain. By William Hunter Workman and Fanny Bullock Workman. 8vo. Pp. 24 + 380. Map and 202 illustrations. New York: Chas. Scribner's Sons. 1904.

This is a narrative, in journal form, of extended travels in India, mainly by bicycle, the chief purpose being a study of the architectural remains. The greater part of five years was occupied in these wanderings, during which time the authors covered India from the Vale of Kashmir to Cape Cormorin, besides visiting Burma and Ceylon. The narrative is well told and is of great interest, as much concerning the peoples, their home life and industries, is scattered about with the story of bad roads, bad food, and bad beds in Dak bungalows. But the chief interest of the book is in the illustrations. There are fine reproductions of most excellent photographs of the wonderful architecture of the past, created by peoples now gone or degenerate. H. G.

The Story of the Kongo Free State. By Henry Wellington Wack. 8vo. Pp. 15 + 634. Illustrated. New York and London: G. P. Putnam's Sons. 1905.

This is a history of the Kongo State, drawn largely from documents in the possession of the Belgian government, and is intended as a defense of the administration of the state against the attacks of the English press. Whatever be the merits of the controversy, the book is of great interest and value as a summary of the history of this most remarkable experiment in empire-building. Certain it is that with the restriction of liquor dealing and the abolition of the slave trade, both of which are due to the government of the Kongo Free State, the condition of the native races is immeasurably improved. Add to these the start which has been made in educating them and in training them to habits of industry, and the existence of the state is amply justified.

H. G.

Breaking the Wilderness. By F. S. Dellenbaugh. 8vo. Pp. 23 + 360. Illustrated. New York and London: G. P. Putnam's Sons. 1905.

The purpose of this book is stated by the author in the preface to be "to present a review in chronological order of the important events which contributed to breaking the wilderness that so long lay untamed west of the Mississippi." Some fifty pages are devoted to the beaver and the buffalo on the plea that they induced exploration and settlement. There is nothing said, however, of mines of the precious metals, which of all attractions were far the most potent. Fifty more pages are devoted to the Indians, though why they should appear in this connection, except incidentally, is not apparent.

The remainder of the book is occupied with accounts of certain exploring expeditions, beginning with the lies of Cabeza de Vaca and including Coronado's expedition and other early Spanish explorations. Of those of more recent time accounts are given of the Lewis and Clarke, Pike, the Astor expeditions, Bonneville, Long, Fremont, and numerous hunters and trappers, finally closing with the well-known narrative of Powell's exploration of the Colorado. There is in the book scarcely an allusion to the numerous exploring expeditions carried on by the army since 1850. Even that magnificent series of explorations known as the Pacific Railroad surveys, from which our first map of the West was built up, is conspicuous by its absence. In later years the Survey of the Fortieth Parallel, the Hayden Survey, and the Wheeler Survey, which were contemporaneous with the Powell exploration of the Colorado, and certainly as fruitful in results, are not mentioned. The history of exploration of the West is yet to be written.

This book is printed on heavy paper, and is finely illustrated with half-tones, but the pictures should, if the book reaches a second edition, be redistributed. At present they bear no relation to the adjacent text, but have apparently been thrown in haphazard.

H. G.

NATIONAL GEOGRAPHIC SOCIETY

POPULAR MEETINGS

National Rifles' Armory, 920 G street, 8 p. m.

April 14.—"Fighting the Boll Weevil." Dr L. O. Howard, Chief of the Bureau of Entomology. Illustrated.

April 28.—"Niagara Falls." Dr G. K. Gilbert, of the U. S. Geological Survey. Illustrated.

May 5.—"The Philippines." The Secretary of War, Hon. Wm. H. Taft.

May 13.—The Annual Long Distance Excursion of the Washington members of the National Geographic Society, probably to Indian Head.

SCIENTIFIC MEETINGS

Hubbard Memorial Hall, 8 p. m.

April 7.—"Forestry." Messrs Gifford Pinchot, Overton W. Price, and members of the Bureau of Forestry.

April 21.—"Along the Labrador Coast." Wilfred T. Grenfell.

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VOL. XVI, NO. 5 WASHINGTON MAY, 1905

THE NATIONAL GEOGRAPHIC MAGAZINE

THE FISHERIES OF JAPAN*

BY HUGH M. SMITH, DEPUTY U. S. FISH COMMISSIONER

THE Japanese farmer has been called the root of the Empire. The Japanese fisherman is a hardly less important member of the body politic, and, as it is quite likely that fishing antedated agriculture as an industry in Japan, it is not inappropriate that the fisherman's story be heard before the farmer's this evening.

Recent developments on land and water in the Far East have led to increased study of things Japanese, and we have learned of so many matters in which the Japanese people are eminent and preëminent that we are perhaps prepared for the statement that Japan in various important respects is today the leading fishing nation and has many branches of the fishing industry which are unique.

Probably in no other country of equal rank has fishing occupied a more prominent place in the material and esthetic development of a people. A mere glance at the map of Japan suggests the rôle which would be played by the sea. A numerous population, combined with a very limited area of arable land, at a very early period led to the development of important maritime interests. Centuries ago the Japanese had become the Phœnicians of the Far East. Their fisheries grew side by side with their navigation and shipping and became relatively more and more important with the more complete occupation of the agricultural land, so that at the dawn of the twentieth century we have seen the nation blossom out not only as a leader in the coastwise and foreign shipping trades and in fishing, but as one of the great naval powers of the world.

To quote an American student long resident in Japan, "Japanese art, poetry, romance, and folklore are full of the sea, its wonders and its possibilities for man. Even the ancient Shinto liturgies celebrate the blue plain of the sea, the ship and her equipment, the fishers and their spoils. Of the two gods of daily food seen in nearly every Japanese house one sits on two bags of rice, the native staff of life, and the other holds a *tai* or bream fish under his left arm, while his right hand grasps a fishing pole. These gods are not Buddhist or continental, but are of pure Japanese origin."

The fisheries of Japan are less valuable than those of several other countries, but they take first rank over

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*Abstract of an illustrated address to the National Geographic Society, March 17, 1905.

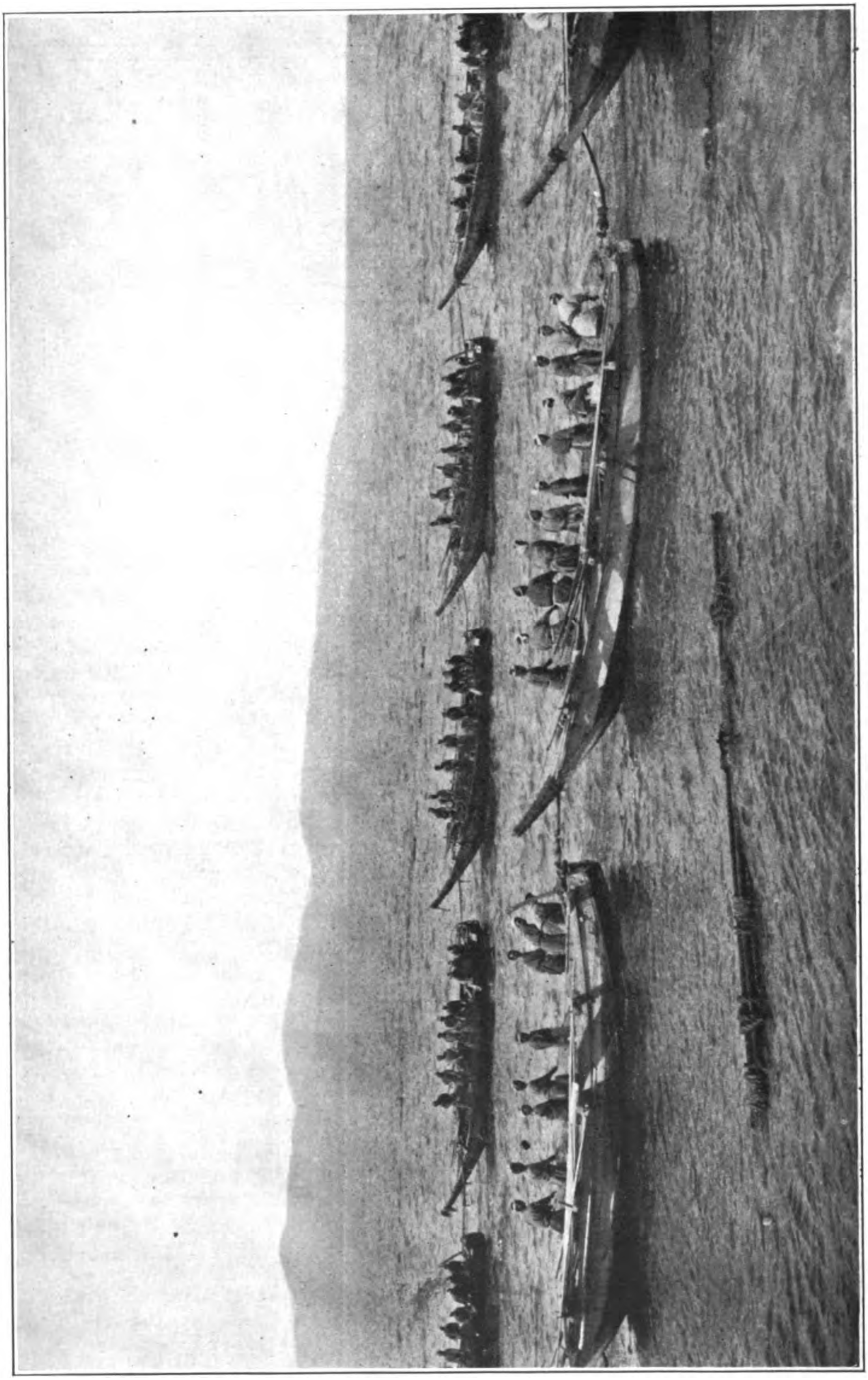


Photo by Hugh M. Smith

Hauling a Yellow-tail Net, Southern Shikoku. See page 212 those of all other nations (1) in the actual number of people making a livelihood thereby; (2) in the relative number of persons engaged in and dependent on the industry; (3) in the quantity of products taken annually from the water; (4) in the relative importance of fishery products in the domestic economy; (5) in the ingenuity and skill shown by the people in devising and using fishing appliances and preparing the catch for use; (6) in the extent to which all kinds of water products are utilized; (7) in the extent to which the fisheries of foreign countries have been studied and the best methods adapted to home conditions; (8) in the extent to which aquiculture has been carried; (9) in the zeal and intelligence displayed by the government in promoting the development of the fisheries and the welfare of the fishing population.

From the earliest times down to the present day, fishing has supplied the staple animal foods and a large portion of the vegetable and mineral foods consumed in Japan, and none of the other great powers is now so dependent on the water for subsistence. So important are water products and so numerous are their kinds and the methods of preparation, that I venture the assertion, from what I have seen of domestic life in Japan, that every day in every Japanese family some form of fishery food is served—I am almost ready to say at every meal.

The Japanese fishermen as a class are hardy, skillful, energetic, sober, self-reliant, to which qualities is superadded a spirit of intense bravery and patriotism, which makes them invaluable, indeed indispensable, in the crisis through which Japan is now passing. With ingenuity and deftness which, it seems to me, are unsurpassed by any other people, the Japanese have devised apparatus and developed methods which centuries ago brought their fisheries to a very high degree of effectiveness; but not content with this, they have within our own time superimposed upon and adapted to their own already well-nigh perfect fisheries all that is best and most useful in those of other countries, so that today fishing with the Japanese is more than a mere industry—it is almost a fine art.

EVERY KIND OF WATER PRODUCT IS UTILIZED

A striking feature of the Japanese fisheries, and one which might reasonably be expected in a people so frugal and ingenious, is the utilization of all kinds of water products which in the United States and in many European countries are wholly or largely neglected. In the matter of eating aquatic animals and plants the Japanese have few prejudices, and what they do not eat they utilize in other ways. As examples I may mention marine vegetables, to which further reference will be made, and sharks, which are among the commonest and most wholesome of the Japanese food-fishes. They are sent to the markets in immense numbers, reach there in excellent condition, and are butchered as beeves are in our country. I believe the time will come when we shall have attained that degree of civilization which will make fashionable the eating of sharks, skates, and similar fishes now generally discarded. Meanwhile many of us will be content to eat the so-called "fresh fish" of our markets, albeit days and weeks old, reeking with putrefactive bacteria, and kept "fresh" by contact with melting ice when not exposed to the air of a dirty stall.

Some of the factors which underlie Japan's prominence as a fishing nation have already been indicated. The geographical position and the physical character of the country have, of course, been potent in developing the fisheries. The extension of the Empire diagonally through 35 degrees of latitude and 38 degrees of longitude, the shape of the

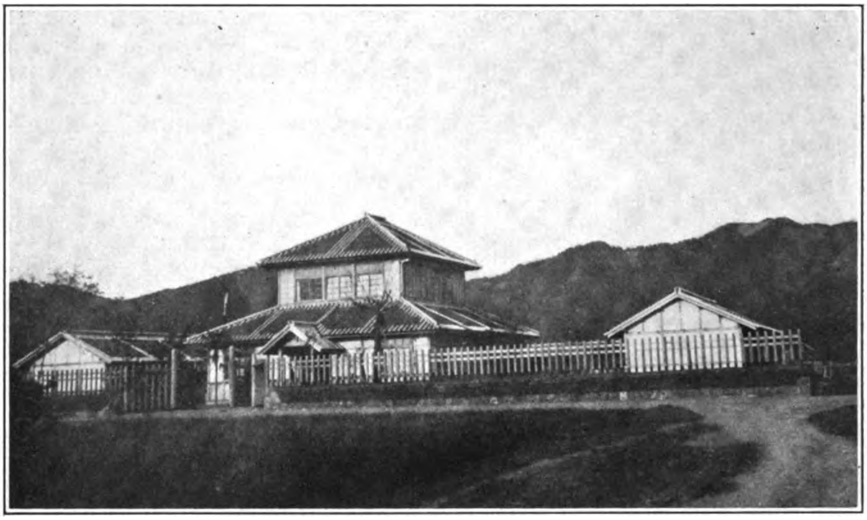


Photo by Hugh M. Smith

A Fishery Experiment Station in the Province of Tosa

archipelago, the thousands of islands, and the great length of the coast line (estimated at 20,000 miles) have brought a large part of the population within easy reach of the sea. To these is to be added a wonderful variety of water life, upwards of 1,000 species of fishes being already known and other classes being correspondingly well represented. Furthermore, there is a remarkable abundance of the most useful animals—some fresh water or anadromous species, some peculiar to the inshore waters, others high-sea forms which come close to the coast in immense numbers and are perpetually renewed, water several thousand fathoms deep being within a very few miles of the main islands.

THE GOVERNMENT FOSTERS THE FISHERIES

The attitude of the Imperial government has had a powerful influence in the growth of the fisheries. Since the Restoration the control of the industry has been vested largely in the central government, by which everything has been done that the most enlightened civilization could require to promote the interests of the fishermen and insure the prosperity of the fisheries. Long ago the Imperial 'Fisheries Bureau was organized, as a branch of the Department of Agriculture and Commerce, and is splendidly equipped and ably administered by specialists in fish culture, biology, economic fisheries, and fishery law. Its work is conducted on broad modern lines, with great stress laid on scientific investigation as the basis for legislation and promotion. With characteristic progressiveness, the government has sent representatives to America and Europe to study fisheries and fish culture, and the best practices of foreign lands have been adapted by the Japanese to their own special requirements. In each of the numerous prefectures there is a department of fisheries, and the local governments, not less than the central government, appreciate the value of experimental and biological work in connection with the fisheries, and have established many stations and laboratories, which are rendering excellent service.

THE IMPERIAL FISHERIES SCHOOL

The Imperial fisheries school, located in the outskirts of Tokyo, is an institution which the Japanese may be pardoned for regarding with great pride, for in no other country does there exist a similar establishment which can compare with this in comprehensiveness of curriculum, completeness of equipment, and thoroughness of instruction. The last week of my sojourn in Japan I was invited to speak before the faculty and students of this school on the fishery work of the United States government. After I had been shown about the place and seen something of the methods and equipment I felt exceedingly doubtful of my ability to impart any information. The institution aims to equip young men for careers of usefulness in connection with the fisheries. The graduates obtain good positions in the government service and in fishing, fish-curing, and fish-cultural establishments. There are three departments of study, each with a three years' course, with provision for post-graduate work. There is a full corps of able professors, instructors, and assistants, some of whom have taken degrees abroad. English is a required study in each course. The department of fishing includes in its regular curriculum such subjects as methods of fishing, navigation, seamanship, shipbuilding, meteorology, oceanography, applied mechanics, applied zoölogy, applied botany, mathematics, law, economics, bookkeeping, and elementary fisheries technology. The department of fisheries technology has special instruction in marine food products, marine industrial products, bacteriology, applied mechanics, chemistry, industrial chemistry, chemical analysis, applied zoölogy, applied botany, law, economics, and bookkeeping. In the department of pisciculture the subjects are fresh-water culture, salt-water culture, protection of fish, embryology, bacteriology, oceanography, chemistry, applied zoölogy, applied botany, law, economics, and book-keeping. The institute has an annual income from the government amounting to $70,000, and several minor funds.

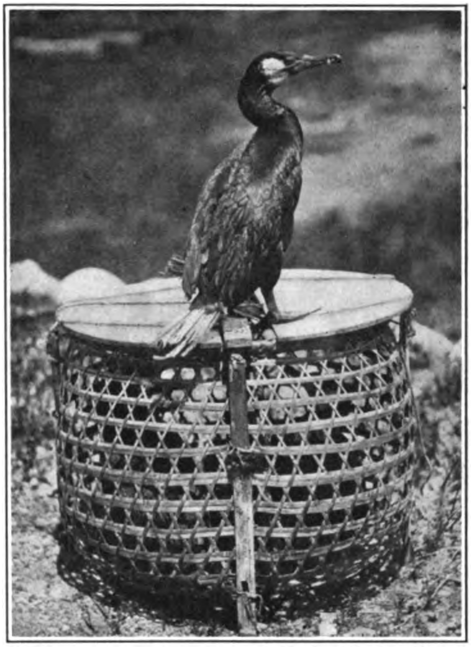


Photo by Hugh M. Smith

A Trained Fishing Cormorant, with Its Cage

THE RELATIVELY LARGE NUMBER OF FISHERMEN

Complete statistics of the Japanese fisheries have not been collated, and many details that one would like to know are not available, but enough is published officially to show the vast extent of the industry. The number of people who are engaged in the different branches is 3,000,000, as against about 215,000 in the United States. Nearly one-six-

Photo by Hugh M. Smith

A Cormorant Trainer and Fisherman

teenth of the entire population is employed in the fisheries, as against one five-hundredth in the United States. The annual tribute which the seas, the rivers, and the lakes now pay to the Japanese fishermen is worth about $30,000,000. The value of the United States and British fisheries is about half as much more; but while our fisheries produce less than 1,000,000 tons of products and the British only half as much, the Japanese yield the prodigious quantity of 3,000,000 tons.

A preponderating proportion of the fishery products is consumed at home, but certain articles are, nevertheless, exported in large quantities, and some products of the Japanese fisheries may be found in almost every civilized country. Over 80 per cent of the exports go to China, these consisting chiefly of prepared seaweeds, dried trepang, dried cuttle-fish, shark fins, and abalone. Strange to say, the country which ranks next to China is Italy, to which the exports comprise only coral. This is like "carrying coals to Newcastle," for Italy has been preëminently the country for corals. Hereafter when an American lady purchases a coral brooch or necklace in Naples or Rome or Venice, she may be reasonably certain that it was some hardy Japanese fisherman off the southern coast of Kiushiu or Shikoku who drew the rough coral from the sea. To Germany the Japanese export agar-agar and fish oils; to Korea, salt and kelp; to Asiatic Russia (formerly), marine salt; to Belgium, fish oil; to France, abalone shells; to England, fish oil, agar-agar, and sealskins; to Hawaii, dried fish and cuttle-fish. The exports to the United States are at present insignificant, and consist mostly of agar-agar, abalone, and dried fish, for the use of Chinese and Japanese.

The Japanese high-sea fisheries for whales, fur-seals, cod, halibut, etc., are important, and the lake, river, and pond fisheries yield large quantities of products; but the coastwise fisheries alone are sufficiently extensive to give Japan its prominent position as a fishing nation.

THE PRINCIPAL FISHERIES

Some of the most valuable objects of the fisheries are similar to or identical with ours. The sea herring is king of fishes in Japan, just as it is in some European countries and in the world at large. It is worth $4,000,000 yearly to the Japanese, and is particularly abundant in Hokkaido. Next in importance is the sardine, valued at $3,700,000. It is extensively canned and also eaten fresh and sun-dried. The bonito ranks third in value, the annual sales being $2,000,000. It is preserved in a peculiar

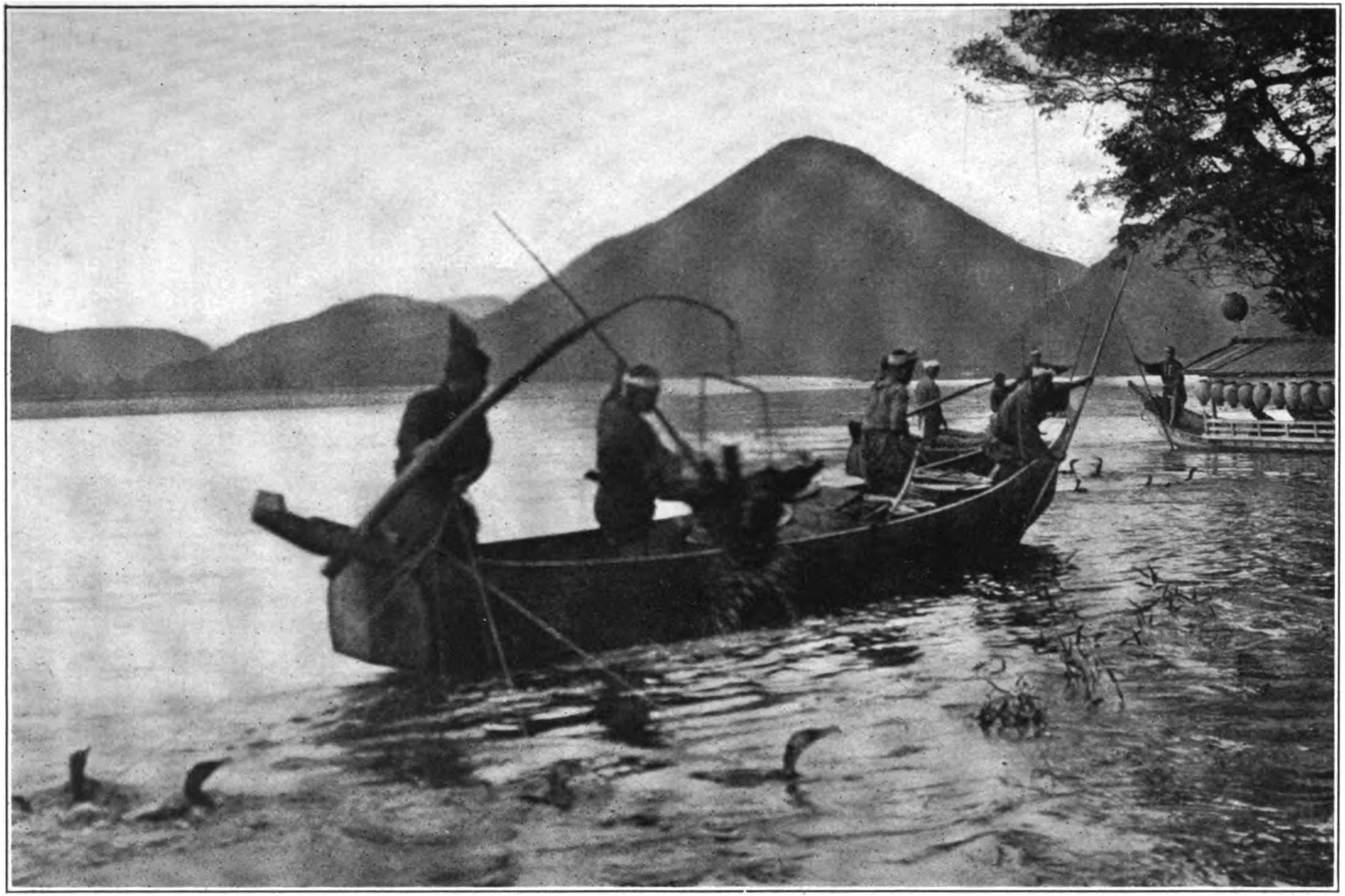


Photo by Hugh M. Smith

Fishing with Cormorants, Nagara River. See page 213

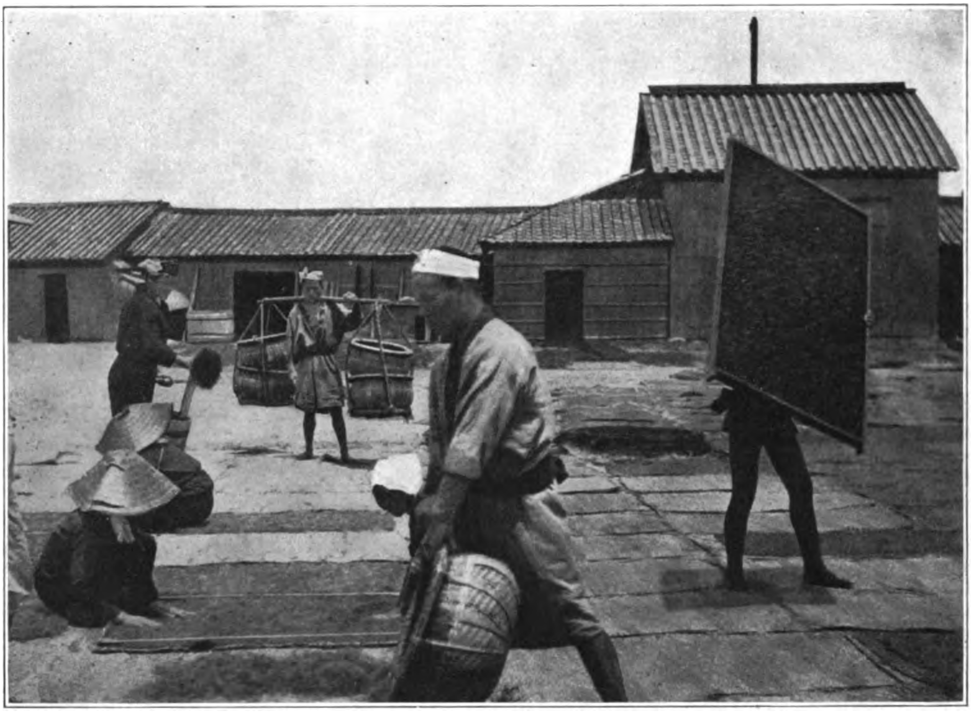


Photo by Hugh M. Smith

Spreading the Wet Funori on Mats to Bleach and Dry

From certain kinds of seaweed which they call "funori" the Japanese make excellent glue. The seaweed after being cleaned is soaked in fresh water and then spread out in thin sheets on mats. When sufficiently bleached the sheets are gathered and rolled up in bundles. They are then converted into a glue or a paste, when needed, by being put into boiling fresh water. The glue, which also is called funori, is employed principally for the glazing and stiffening of fabrics and as a starch for clothing.

way, and is always kept on hand as an emergency ration in Japanese houses. A fish similar to our scup, known as the tai, is worth about $2,000,000 yearly. It is the favorite fish for fresh consumption, and when served raw, with soybean sauce, is a delicious food. Other prominent products with which Americans are well acquainted are mackerel ($1,000,000), tunny or horse mackerel ($900,000), amber-fish or yellow-tail ($1,000,000), squid and cuttle-fish ($1,500,000), anchovies ($800,000), prawns ($700,000), and salmon ($600,000).

The Japanese have no fisheries comparable with our shad, river herring, menhaden, striped bass, whitefish, pike perch, lake trout, soft crab, lobster, and sponge fisheries, and their oyster, clam, salmon, mullet, cod, halibut, and whale fisheries are insignificant in comparison with ours. On the other hand, our sea herring, sardine, anchovy, yellow-tail, tunny, bonito, shark, prawn, octopus, abalone, and seaweed fisheries are of minor value compared with theirs, and we have no cuttle-fish, sea-cucumber, and coral fisheries.

A characteristic scene in the larger coast towns is a crowd of men, women, and children on the shores at low tide searching and scraping and digging with

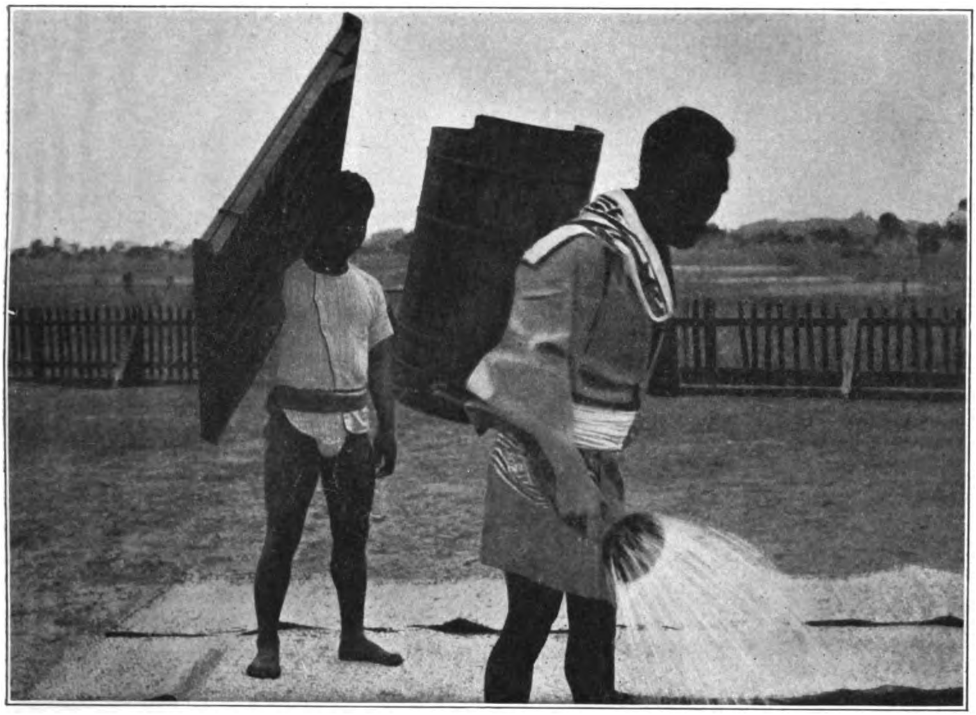


Photo by Hugh M. Smith

Sprinkling the Sheets of Funori to Prevent Curling

hand or stick or rake for any little fish or shell or crab or bit of seaweed that may serve as food. In Yokohama, where I first saw this practice, swarms of poor people appear on the beach at each period of low water, and seldom fail to carry home with them enough of the bounty of the sea to serve for several meals. Similarly, at low tide boats resort to the marshes and bars for the purpose of gathering any kinds of products that may have been stranded or that may be accessible by wading.

The Japanese have many holidays and festivals. One of the national holidays is devoted to girls, and another, in May, is the special property of boys. Besides games and festivities in which boys are particularly interested, a feature of this holiday is the throwing to the breeze from nearly every house hollow paper and cloth fishes, some of them 20 feet long, representing carp and having a special significance.

The Japanese make many presents, and it is the invariable practice to insert under the special cords with which a present is tied a peculiarly folded piece of decorated paper, within which is placed a small, thin strip of dried abalone. One of the most approved presents for New Year's day is a whole dried salmon.

Ingenious and important uses are made of many products which with us are mere curiosities. In a town near Tokyo I saw a shop devoted to the manufacture and sale of lanterns made from the dried skins of swell-fish. In the Loo-choo Islands water snakes are a common article of food. They are prepared for market by drying in an extended or

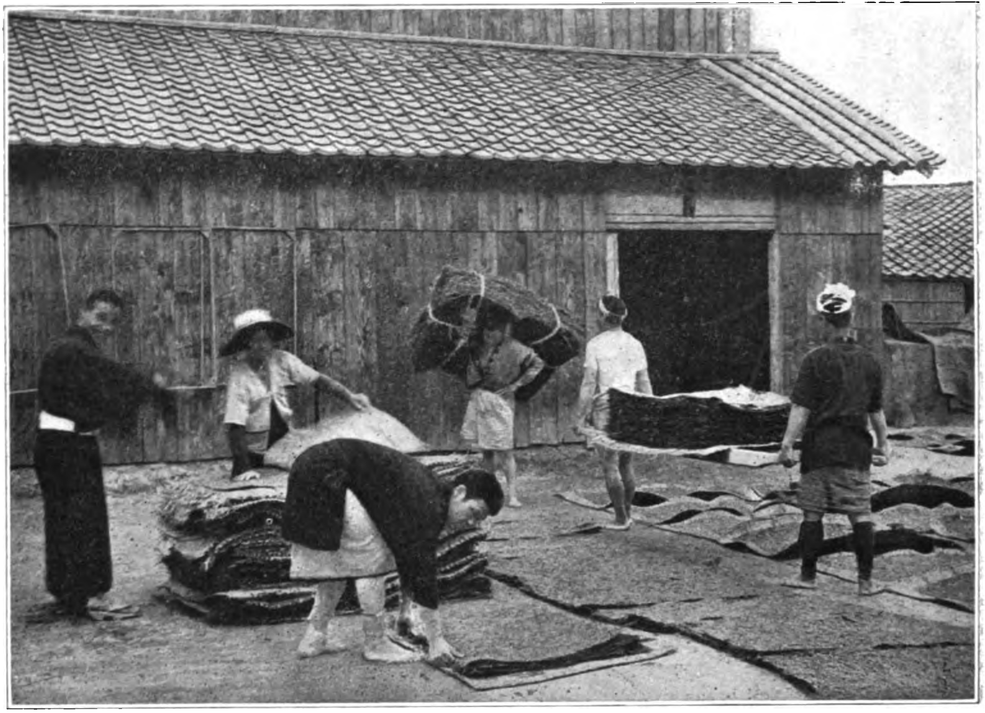


Photo by Hugh M. Smith

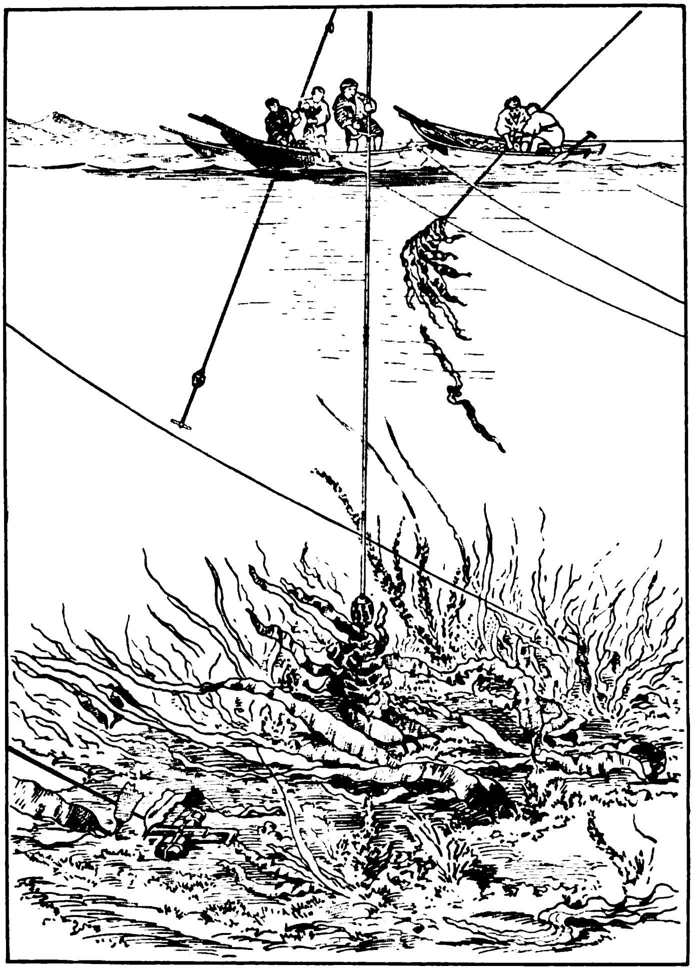
Gathering the Dried Sheets of Funori for Baling and Shipment

slightly wavy position, those I saw being about a yard long.

Nothing would seem to us to be of less value than the dried strings of egg cases of whelks, which are so common on our sandy shores, and yet in Japan I saw street vendors with push-carts loaded with these objects dyed a bright-red color and tastefully arranged on masses of wet seaweed, and many half-grown girls were buying them and making a blowing noise by putting them between the tongue and palate. The demand for these articles is so great that the supply obtained naturally is inadequate, and a kind of culture has sprung up.

FISHING JUNKS

Fishing vessels and boats are of various patterns, according to the region, the fishery, etc., but all those used in marine fishing are alike in being very strongly and heavily built, many being almost clumsy from our standpoint. They are usually constructed without the use of nails, and are not painted. The boats are for the most part arranged for sculling instead of rowing, and their crews are large. It is no uncommon thing to find 8 to 12 men constituting a boat's crew, whereas with us a similar boat and fishery would require only 2 to 4 men. The sails are frequently of the junk rig and sometimes consist of five or six upright widths of straw matting loosely laced together. The fishermen venture far offshore in small open boats, sometimes as much as 75 miles, in quest of certain pelagic fishes. The first intimation I had of the proximity of the Japanese coast on the voyage



From Hugh M. Smith

Gathering Kelp with Poles and Drags

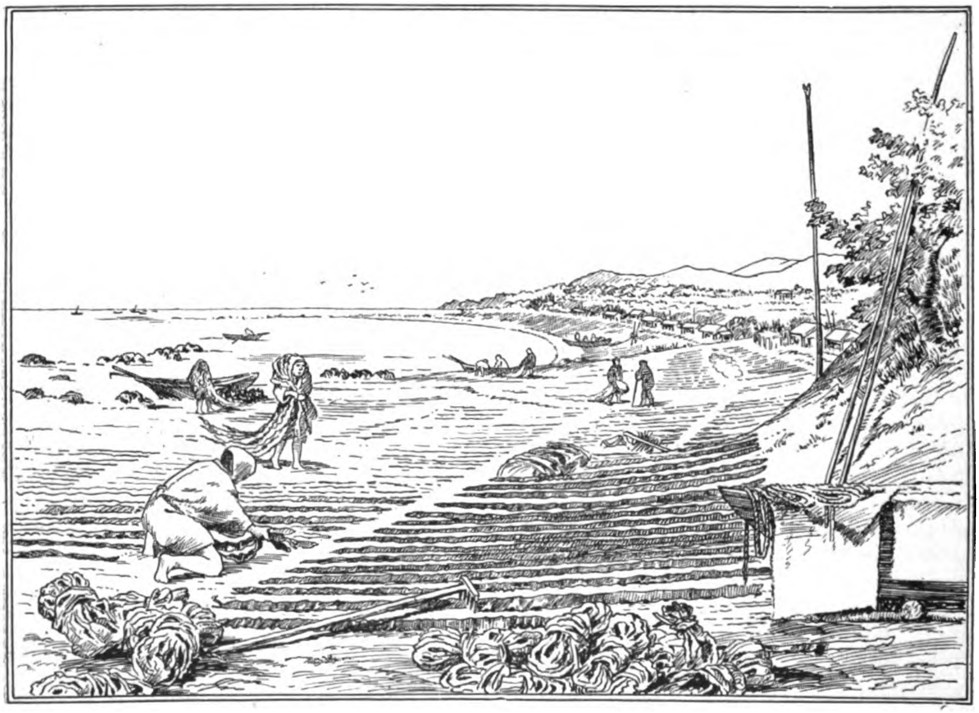
A large business is done in Hokkaido, the most northern of the main islands of Japan, in gathering coarse broad-fronded seaweeds (Laminariaceæ) termed "kombu," which are used as pickles, seasoners, and relishes, and also as vegetables. Some varieties are served as sweetmeats and others made into powders and used as tea. The fishermen go to the kelp grounds in open boats, each boat with one to three men and a complement of hooks, with which the kelp is torn or twisted from its strong attachment on the rocky bottom. The hooks are of various patterns; some are attached to long wooden handles, and some are weighted and dragged on the bottom by means of ropes while the boats are under way.

from San Francisco was the sighting of small fishing junks; and in order to inspect some of the fisheries in southern Japan in which I was particularly interested it was necessary to seek the fishermen out of sight of land. While the offshore fishing boats are sturdy, the government is not altogether satisfied with their suitability for the rough water and strong winds which prevail, and is endeavoring to introduce and popularize more seaworthy boats modeled after the American types.

CATCHING THE YELLOW-TAIL

Reference has been made to the importance of the amber-fish or yellow-tail. Along the southern shores of Shikoku the taking of this species is the chief fishery, requiring a large outlay of capital and employing many men. The apparatus used is a huge bag net, with long straight wings. When a school of fish has entered the net, the boats close in, the fish are driven into the bag, and are finally pocketed. I believe I am safe in saying that the yellow-tail nets are larger than any other set nets in the world and require the services of more men. Each net is attended by 25 to 30 boats, including a look-out boat with an elevated perch, and 150 to 200 men are in constant attendance. A net which I visited and saw drawn had two wings each 3,000 feet long, one of them extending to the shore; the bag was 900 feet long, 250 feet wide at its mouth, and 125 feet deep. During a season of two and a half months this net had stocked $50,000, which was an ordinary catch. On one occasion 10,000 yellow-tails, averaging 20 pounds each, were taken at one haul. A very useful method of preserving the yellow-tail, which insures cleanliness and easy transportation, is to soak the fish in brine, cut it into four lengthwise sections several feet long, remove the bones, wrap each piece in rice straw, and wind it with a straw rope. This preparation is called *maki-buri* and is an excellent food product.

The most remarkable of the fresh-water fishes of Japan is the ayu or sweet-



From Hugh M. Smith

Drying Kelp on the Beach in Hokkaido

fish, and perhaps the most curious method of fishing is addressed to it. There is no time to refer in detail to this fish, and I can only say that it is a diminutive member of the salmon family, inhabits all the rivers of Japan and Formosa, being at its best in the mountain streams, is probably the most delicious of the fresh-water fishes, and has habits which are not possessed by any other known fish. It is an annual fish—the entire period of its life, from the egg to its death, covering rather less than a year. The Japanese have devised many appliances and methods for taking it, and, not content with pitting their own ingenuity against it, have impressed into their service one of the most skillful of fish-catching birds, the cormorant.

FISHING WITH CORMORANTS

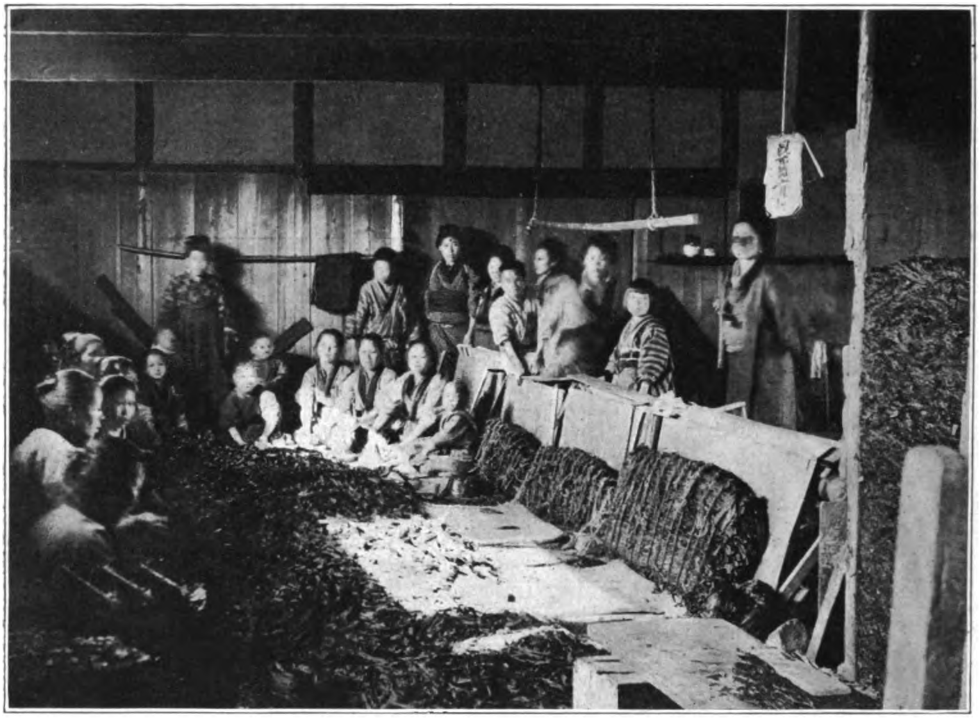
The origin of cormorant fishing in Japan is lost in a very remote antiquity. At least a thousand years ago it is known to have flourished, and there is a tradition of its existence upward of two thousand years ago. Much romance and history are connected with the fishery in the early days, and the names of some of Japan's greatest warriors and statesmen are associated with it. While a commercial enterprise, it does not, however, give employment to many people and is not conducted in many places. It is confined to rivers, and the most extensive, interesting, and famous fishery is that in the Nagara River and the most noted of the cormorant fishing villages is in the outskirts of the large city of Gifu.

At the time of my visit, the chief cormorant fisherman, whose ancestors for many generations had engaged in this fishery in the same locality, attired himself in the peculiar dress of the profession for the purpose of exhibiting his birds and the methods of handling them. Later he and all the other fishermen on the river went to a rendezvous and gave a practical demonstration of cormorant fishing.

The cormorants are controlled by means of a slender cord, which passes around the bird's breast and is tied in the middle of the back. The cord is made of woody fibers of the cryptomeria tree, with the exception of a short section next to the bird, which consists of whalebone. There is a supplemental cord tied around the neck at the lower end of the gullet for the purpose of preventing the fish from passing so far that they cannot be recovered. The tying of this cord is a delicate operation, for if too tight it may injure the bird and if too loose it will allow the fish to be swallowed.

The fishery is conducted from boats, which are of a special type, being long, narrow dug-outs, propelled primarily by paddles, but when en route to the fishing grounds often provided with a sail. Each boat has a crew of 4 men and a complement of 16 cormorants. Late in the afternoon the boats start for a place in the river where fishing will begin, the cormorants being stowed away in pairs in bamboo baskets. The fishing grounds cover many miles, and operations are confined to successive sections of the river nightly, in accordance with law. Stretches several thousand yards in length are set aside as Imperial preserves, on which no fishing is permitted.

As soon as darkness prevails, a blazing fire of pine wood is kindled in the iron basket overhanging the bow of the boat, and the boats drift downstream together, sometimes in a mixed group, sometimes in a line extending across the river, each guided and propelled by 2 men. The captain, standing near the bow, manages 12 cormorants and his assistant 4, the cords being held between the fingers and frequently shifted as the birds move about. With the cormorants diving and darting in all directions, those of different boats often mingling, it is a wonder that they do not soon become inextricably tangled, but so skillfully are they managed that the lines rarely become fouled. In a



Women Engaged in Sorting the Crude Kelp

short time the cormorants' gullets begin to bulge with ayu; when they are well filled the birds are pulled up to the gunwales one by one and their catch is gently squeezed into baskets. This continues for several hours, and each cormorant may fill its gullet fifteen to twenty times.

Spectators usually go to the fishing grounds in a kind of barge, illuminated by lanterns, and eat their dinner on board while waiting at a convenient point for the fishing boats to arrive. During the evening when I witnessed the fishery the seven boats in whose operations I was particularly interested averaged 700 to 800 fish apiece, and the aggregate catch was worth $150—a very respectable sum to Japanese fishermen.

The fishery is prosecuted with enthusiasm by both men and cormorants, and the shouts of the fishermen, the hoarse croaking of the birds, the rush of the mountain stream, the splashing and creaking of the paddles, the hissing of the embers as they fall into the water, the weird lights and shadows combine to make a performance which a westerner is not likely soon to forget.

TERRAPIN FARMS

The cultivation of water products has gone hand in hand with the fisheries, and in certain lines has attained greater perfection and extent than in any other country. The raising of terrapin, which with us is an unsolved problem and has only recently been seriously considered, has for years been very successfully carried on by the Japanese. I visited a terrapin farm near Tokyo, where 50,000

View at an Osaka Kombu Factory

Dyed kelp drying on poles; shredded kombu drying on mats and ready for baling

to 60,000 artificially grown terrapin are placed on the market annually. Without any outside aid or suggestions, the Japanese have evolved special methods for the cultivation of many kinds of mollusks, including the pearl oyster, the ark-shell, several clams, and various other lamellibranchs, and, in addition, the common oyster. That the Japanese should realize the importance of oyster culture is not strange; but that they should have taken it up a century before our nation was born and have recognized the most essential factor in successful cultivation, namely, individual ownership or control of the oyster bottoms, comes as something of a shock to our national pride when we remember that in the most important oyster region in the world, within a short distance of the Capital of the United States, the vital principles of oyster culture are ignored and efforts to apply them are resisted sometimes by force of arms. The cultivation of oysters has reached greatest perfection in the Inland Sea near Hiroshima, and some very ingenious methods have there been evolved, which are described in a paper by Dr. Bashford Dean recently published by the U. S. Bureau of Fisheries.

JAPAN IS THE ONLY COMPETITOR OF THE UNITED STATES IN THE CULTIVATION OF THE SALMON

Among the fishes regularly cultivated are the eel, the mullet, the carp, the goldfish, and several salmon and trout. The important salmon fishery in northern Japan having suffered from deple-

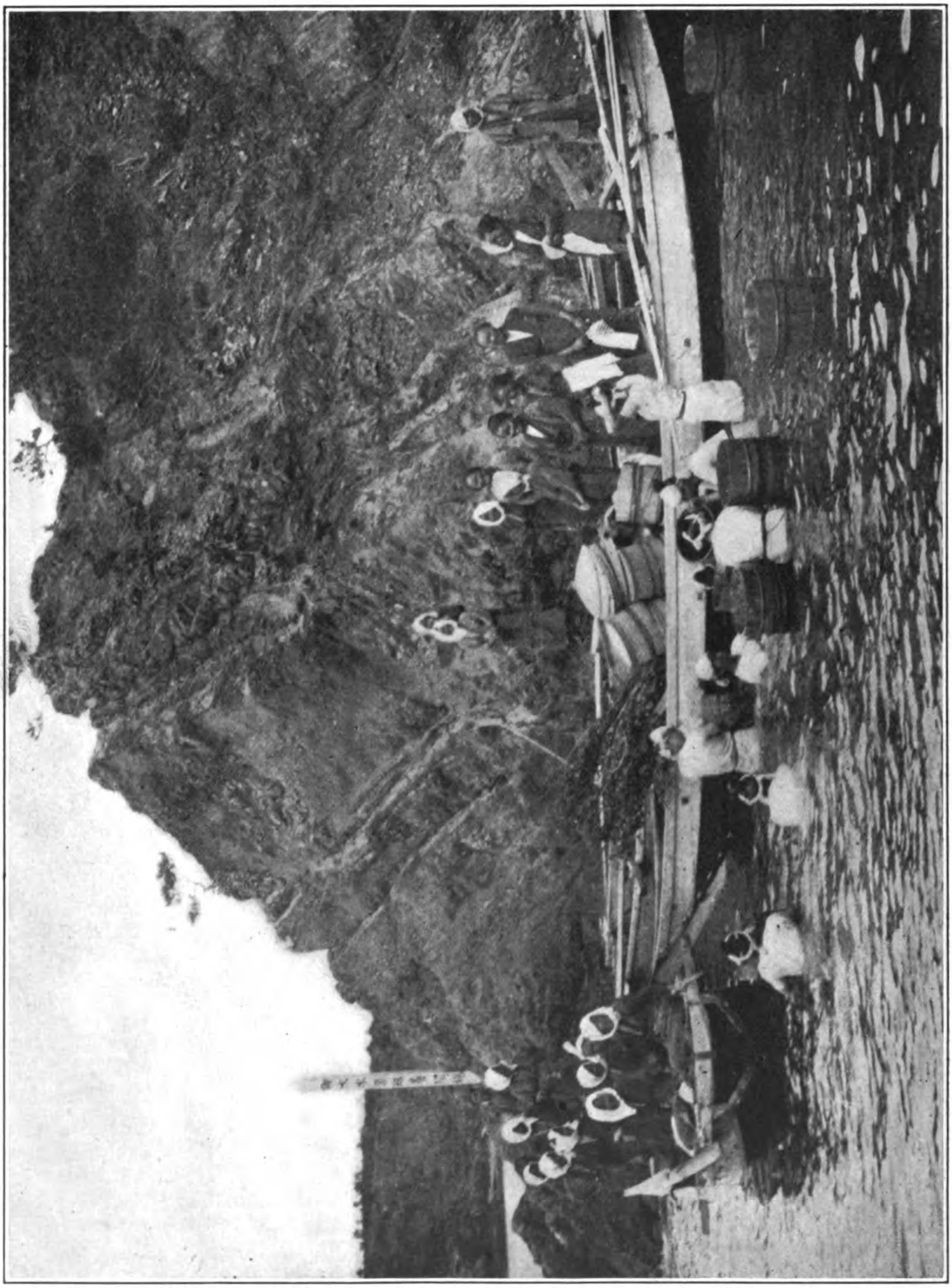


Photo by Hugh M. Smith

Women Divers, Province of Shima

tion of the streams, the government sent a representative to this country twenty years ago to study our hatching methods. It goes without saying that he took home with him a well-filled note book, and, in addition, the plans of one of our salmon hatcheries, and shortly afterwards from those plans built in Hokkaido the first salmon hatchery in Asia. With this as a model and center, salmon culture in Japan has steadily grown, until there are now eighteen salmon hatcheries in Honshu and Hokkaido, and Japan has become the only competitor of the United States in the artificial propagation of salmon.

The carp has been cultivated from very ancient times and now receives much attention. In the Tokyo district alone 225 acres of ponds are devoted to carp culture, and the annual crop is upward of 400,000 pounds, valued at $15,000. In one village in the Gifu prefecture 250 acres of paddy fields, in which there is growing rice, have recently been devoted to carp culture by the local agricultural society, and 25,000,000 young fish are now procured there annually and sold for stocking purposes. It is a significant fact that the carp not only does not injure the rice plants, but benefits them by devouring destructive insects, whereas in this country one of the very loudest and longest wails against the carp is that it uproots aquatic vegetation.

GOLDFISH FARMS

The goldfish receives more attention than any other species, and the place it holds in the affections of the masses illustrates one of the racial characteristics of the Japanese—namely, the love for the beautiful and ornamental, and the time and money all classes bestow on things that appeal to the esthetic rather than to the mercenary and practical. Although the goldfish occurs in a wild state in Japan, it is probable that China some 400 years ago furnished the stock from which the wonderful varieties of Japanese goldfish have been bred. It is reported that in feudal days, even when famine was abroad in the land and many people were starving, the trade in goldfish was flourishing. The demand at present appears to be without limit, and the output shows a substantial increase each year. Many thousands of people make a living by growing goldfish for market, and hundreds of peddlers carry the fish through the streets and along the country roads in wooden tubs suspended from a shoulder bar. The leading goldfish center is Koriyama, near the ancient capital city of Nara. Here are 350 independent breeding establishments, whose yearly product runs far into the millions. One farm which I visited was started 140 years ago; at first it was conducted merely for the pleasure of the owner, but it eventually became a commercial enterprise and is now very profitable. The history and methods of goldfish culture in Japan constitute a very engaging theme, not less interesting to the biologist than to the fish culturist. Some of the current American ideas of the manner in which the remarkable varieties have been produced are preposterous, and evoked much merriment among the Japanese when I mentioned them.

FAMOUS WOMEN DIVERS OF SHIMA

Shima, the smallest of the Japanese provinces, has been celebrated from the earliest times for its women divers, and more recently has acquired other distinctions connected with the fisheries. The divers have inherited, through many generations, an aptitude for water life which makes them veritable human ducks. The principal objects of their attention are pearl oysters, which exist in bays in all parts of Japan, but are particularly abundant in the cold clear waters of this province. The valuable pearl-oyster grounds have gradually passed under control of a single proprietor, who employs most of the divers. The supply of pearl oysters having been greatly reduced through overfishing during the years following the restoration, the cultivation of the species was taken up experimentally at the suggestion of Professor Mitsukuri, and has been carried to a very successful issue, the method being essentially that followed by the oyster-growers of New York and Connecticut.

ARTIFICIAL CULTIVATION OF PEARLS

Another interesting cultural enterprise has been started—also at Professor Mitsukuri's suggestion—consisting of the production of pearls by stimulating the mollusks artificially. This is brought about by inserting between the animal and its shell a small spherical nucleus of mother of pearl. This pearl-oyster farm in the Bay of Ago, not far from the famous shrines of Ise, now yields millions of pearl oysters and hundreds of thousands of natural and cultural pearls annually. Each year 250,000 to 300,000 pearl oysters are treated and then returned to the beds, where they are left for four years, so that at all times there are on hand upwards of one and a quarter millions of pearl-bearing oysters. The pearls thus produced are of fine form and beautiful luster, and are marketed in all parts of the world; their only defect is that they are broadly attached to one of the valves, and are thus only half pearls.

LARGE RETURNS FROM SEAWEEDS

A branch of the fisheries in which Japan far surpasses all other countries as regards both extent and ingenuity of method is the seaweed industry. In the United States, notwithstanding our long coast line and seaweed resources, not inferior to Japan's, the annual crop of marine vegetables is worth only $40,000, whereas in Japan these products are worth not less than $2,000,000, and are exceeded in value by only four animal products of the fisheries. Many kinds of algæ are gathered and many uses are made of them. The local consumption is enormous, and large quantities of prepared seaweeds are exported to China, Europe, and elsewhere.

Among the most valuable kinds of seaweeds are the kelps (Laminaria), which are taken in immense quantities on the more northern coasts, particularly in Hokkaido. The fishermen go out in small boats and gather the weeds from the rocks by means of long-handled wooden hooks or heavily weighted drags. The plants are spread flat on the beach to dry, and when thoroughly cured are packed in bundles and sent to manufacturers in various parts of the Empire, by whom they are prepared for market in a great variety of ways, under the general name of *kombu*. Kombu is one of the staple foods of the country, entering into the dietary of almost every family and being eaten alone as a vegetable or as a seasoning for meats, fish, stews, etc. This business has been carried on since about 1730, employs thousands of men, women, and children, and is worth from $500,000 to $1,000,000 a year.

Various algæ with soft pulpy fronds are dried by the fishermen and sold to dealers for manufacture into a kind of glue. The weeds are soaked in fresh water, made into thin, loose-meshed sheets, and rolled like Japanese matting. When ready for use such sheets are boiled in fresh water, and the pasty mess resulting is employed as a starch for clothing, in stiffening fabrics, in cementing walls and tiles, and in other ways. This business dates from about 1670, and is now conducted in over 100 establishments.

A very valuable seaweed product, and the one with which Americans and Europeans are most interested, is vegetable isinglass or agar-agar. It is made from weeds rich in gelatin by boiling them in fresh water and straining the pulp through coarse cloths. The business began about 1760. In the early years the product was sold in bulk, but at present the entire output, for convenience in handling and using, is in two forms—slender sticks about a foot long, used locally in preparing food-jellies or exported to America and Europe for making culture media in bacteriological work, and square bars 12 to 15 inches long, which are sold largely in Holland for use in clarifying gin. The Japanese name for this product is *kanten*, meaning "cold weather," in allusion to the fact that it can be prepared only during winter, as a low temperature is necessary for the solidification of the jelly. Five hundred establishments are devoted to the manufacture of kanten, and the output in 1902 was 3,000,000 pounds, valued at $750,000. The identical alga from which the Japanese make their kanten abounds on our own coasts, but not a piece of it is now utilized.

EDIBLE SEAWEEDS

One other seaweed must be referred to, because the supply comes almost entirely from planted grounds, and in the cultivation of marine vegetables the Japanese stand alone. In all parts of the world there occurs a red alga known to British and Americans as laver, which was formerly a popular food in the British Isles and sparingly eaten in the United States. From a very remote period the Japanese have utilized this plant, and for centuries—just how long is not known—have carried on an ingenious form of cultivation. In the fall arrangements for the seaweed crop are made by sinking into the muddy bottoms of bays numerous bundles of brush or bamboo. These bundles, which are prepared on shore and taken to the grounds at low tide, are planted in regular lines, deep holes being made for them by means of an elongated conical wooden frame, with handles, which is forced into the mud by the weight of the operator. The brush intercepts and affords attachment for the seaweed spores, which grow so rapidly that by January the plants have attained their full size and the cutting of the crop begins. The plants die about the time of the vernal equinox, and the active business is at a standstill until the ensuing autumn. The best grounds for the cultivation of laver are in Tokyo Bay and are leased by the government. In 1901 the area planted with brush was 951 acres, and the value of the crop was over $148,000, or $156 an acre. In 1903 the same area yielded $300,000, or over $310 an acre. The total area of cultivated grounds in the whole of Japan is about 2,300 acres, and the value of the seaweed grown thereon is $400,000 to $500,000. About 3,500 families are engaged in this form of aquiculture. Small quantities of the laver are eaten fresh, but most of it is sun-dried before it reaches the consumer. The weeds are washed, picked, sorted, and then chopped fine by hand, and the wet, chopped pieces are spread on small bamboo mats and pressed by hand into thin sheets, the mats being placed on inclined frames in the open air. When drying is complete the sheets are stripped from the mats, piled and pressed, and tied in small bundles for market. This product has numerous culinary uses and is found in every Japanese kitchen.

GETTING SALT FROM THE SEA

An important industry in some parts of Japan, more particularly in the southern districts, is the extraction of salt from sea water, which I may be allowed to mention in connection with the fisheries. The output of mineral salt in Japan is insignificant, and the people depend almost entirely on the sea for their supply of this indispensable article. There are many thousand salt fields under cultivation, and over 100,000 people are engaged in this occupation. On the shores of the beautiful Inland Sea and on the much indented, picturesque coast of Satsuma I saw hundreds of these fields, which are large, perfectly flat areas, near the sea-level, with a firm, clean, sandy surface and intersected by narrow drains or ditches, in which the tide flows. Water from these ditches is freely sprinkled by hand over the floor, and, in order to promote evaporation, the wet sand is stirred and raked with a kind of harrow. The sprinkling, stirring, and drying of the sand continue until it can take up no more salt; it is then scraped into piles with a long piece of plank drawn by a workman by means of a rope brought over his shoulder, and placed in peculiar bins, of which each field has many, arranged in regular rows. The sand is then thoroughly washed with sea water, and the highly concentrated brine resulting drains into vats beneath the bins. From the vats the brine is poured into a sluice or flume and conveyed to large reservoirs under cover. As required, it is poured on huge flat iron trays, under which is a hot fire, and the water is driven off by boiling.

The fisheries of Japan are already of vast extent and are exceeded in money value by those of only two countries. There is no other country from which western nations may learn more of practical utility about many branches of the fishing industry, and there is none the study of whose cultural enterprises, governmental relations, and organization and fishery legislation and history will prove more profitable. We cannot foretell what developments the present generation or the next may see, but events are moving so swiftly in the Sunrise Kingdom, the entire business life is responding so quickly to the pace set by the twentieth century, that, whatever the outcome of the present war, the general commercial and industrial progress will undoubtedly be imparted to the fisheries and will be likely to place the money value of the industry above that of all other nations.

A CHAPTER FROM JAPANESE HISTORY*

By Eki Hioki

First Secretary of the Japanese Legation

It affords me great pleasure to have this opportunity of addressing a gathering of such distinguished gentlemen. It gives me special pleasure to do so tonight, because this very day, the 21st of February, 1905, is the fiftieth anniversary of the exchange of the ratifications of the first treaty between Japan and the United States—the first treaty that Japan had ever concluded with any nation of the West.

THE DIPLOMACY OF COMMODORE PERRY

You should be proud of the wonderful skill in diplomacy displayed by your first envoy to Japan, our honored Commodore Perry, and the brilliant success which was achieved by him in inducing a nation, which had so long cherished the policy of seclusion and exclusion, to enter into treaty relations with the powers of the world, the accomplishment of which was brought about without the shedding of a drop of blood or even the happening of a single incident which could now revive any unpleasant memories. I am often led to reason, rightly or wrongly, that when an act of a man is founded on truth and kindness there is no need of the help of language to communicate it to others.

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* An address delivered at Washington February 13, 1905

The conduct of the first American envoy to Japan, as well as those who followed him, was singularly marked with truth and kindness, and it is gratifying, indeed, to know that the annals of the five decades of international relations between Japan and the United States are clean records of friendliness and cordiality. In this connection it is pertinent to quote from the writer of a little volume called "Agitated Japan," who commenced his work with the following words:

"Without the least taint of flattery it may be safely asserted that Japan is indebted to no other country so much as to the United States. This indebtedness began on her first trial of that international intercourse which she has kept up ever since, and will doubtlessly continue as long as the world shall last. It is an undeniable fact that the honor of having opened the hitherto secluded Empire of Japan to foreign intercourse, commercial and otherwise, rests with the United States."

THE JAPANESE APPRECIATION OF WHAT PERRY DID

On July 14, 1901, a monument was erected in memory of our revered Commodore Perry at the spot where he held his first conference with the Japanese authorities. It bears an inscription composed by Marquis Ito, the most prominent of our living statesmen, recognizing in appropriate terms the services of that gallant sailor and shrewd diplomatist. On the occasion of the dedication of the monument the chairman of the committee in charge said in his address: "It was at this spot that the modern civilization of our Empire had its beginning. . . . When Commodore Perry set his foot on this shore the Japanese Empire was enshrouded in the fogs of a seclusion of nearly three hundred years. . . . This monument is erected to preserve in stone our determination never to forget the friendship of the United States that sent Commodore Perry to induce us in a peaceful way to have intercourse with foreign powers."

Such is the memory that the Japanese of today cherish. Indeed, the more we study the magnitude of the transformation that Japan has undergone since the advent of Perry, the higher becomes our appreciation of his work and the part played by the United States in regard to Japan. If the country had been forced open by any means but peaceful, nobody knows where that little Empire would stand today. Were it not for the policy the United States patiently and firmly pursued toward the upbuilding of new Japan, it is impossible to realize what progress she would have made. I am happy to acknowledge frankly our sense of indebtedness to you, and I am proud to say that your kind assistance was not in vain. In fact, these remarks might not have been quite pertinent to the subject chosen for the speech of this evening, but this very day being the fiftieth anniversary of such a memorable event in the history of the international relations of the two countries, it would not have been proper had I not paid my feeble tribute to the noble deeds of your countrymen.

THE RESTORATION

The subject of my speech for this evening is "A chapter from the Japanese history," and the chapter I refer to is the one which deals with the history of the restoration consummated in the year 1868. It is impossible, however, to treat the subject thoroughly and comprehensively within the limit of time which, in my judgment, would be endurable to my audience. I shall therefore confine what I have to say to the main course of events which resulted in the so-called "restoration."

The term "restoration" in the modern history of Japan means the reinstating of the political powers to the *de jure* sovereign of Japan, the Mikado, which had been taken away from him for a period of 682 years (1186–1868) and which had been wielded by the *de facto* sovereign, the shogun or the military government. The history of Japan dates back 2,565 years, exclusive of the ages of gods, when our first Emperor, Jimmu, laid the foundations of the Empire, and our august ruler of today is the 121st of the Emperors descended from the direct and unbroken line of the Imperial family.

Even prior to 1186 the powers of the Mikados had, in a large measure, passed into the hands of the Fujira family, but at that period Yoritomo, a military man of great ability, founded the shogunate or military government for the first time in Japanese history, whereby he practically usurped the political powers of the Mikado and substituted his rule for that of the legitimate sovereign. It was an incidental consequence of one of the phases of human history. In Japan, as in other feudal countries, there had been an alternate tendency toward strong and weak central governments. In order to maintain peace and order and to preserve the nation as a compact unit against a strong tendency toward decentralization which was then prevailing, Yoritomo had fought a series of bloody battles with local chieftains and magnates, and finally succeeded in establishing a vigorously centralized military government over the whole Empire and by the side of that of Mikado. This was the beginning of the dual government in Japan which so much perplexed the westerners at the beginning of the foreign intercourse.

The letters of credence which the President of the United States addressed to the Emperor of Japan were handed over by Commodore Perry to the shogun of the time, and when Townsend Harris, the first United States minister to Japan, was told by the shogun that the treaty required the approval of the Mikado he was astounded. Since the establishment of the first shogunate by Yoritomo, in 1186, down to the fall of the Tokugawa shogunate, in 1868, all real power, civil and military, had passed entirely from the hands of the Mikados, they themselves being allowed to retain only an outward semblance of authority. It was remarkable, however, that through the period of nearly seven centuries when the military government was in predominance no one ever disputed the legality of the Imperial authority. On the contrary, all the shoguns formally recognized that authority by obtaining the Imperial sanction for the appointment of each successor to the shogunate government, as well as in other matters.

It was in 1868 that this *de jure* sovereignty of Japan was restored to full authority after the nominal existence of seven centuries. The manner in which it was brought about is almost unique in the annals of mankind, but what made it more remarkable was the inauguration of a new policy so radically different from what had existed before in Japan, upon which the foundation of New Japan was firmly laid down.

THE FEUDAL SYSTEM OF JAPAN IN 1868

In order to realize the real magnitude of the dramatic period of Japanese history it is necessary to know something of the political regime that existed in Japan at the time of the restoration. Roughly speaking, Japan, under the Tokugawa government, had a feudal system with 276 daimios or feudal barons. These barons had their own respective dominions, and within them they wielded an autocratic power, without any restrictions outside of a certain sort of supervision exercised by and a certain homage paid to the chief baron or shogun. The size of the dominions, the revenues and expenditures, the number of the vassals or retainers, called Samurai or military class, the barons possessed differed according to the rank and influence they enjoyed at the time. Under the feudal system the people were divided into four classes, viz, Samurai, or military class, farmers, tradesmen, and merchants. Of these the Samurai was the privileged class, which was maintained at the public expense of each feudal lord, and it was in the hands of this class that the political activities of Japan found their home.

The feudatories, with the assistance of the retainers or Samurai (who numbered some 400,000 men, and, with their families, 2,000,000 people in the whole Empire), formed the bone and sinew of the nation at that time. While, in the latter part of the Tokugawa government, education was diffused more widely among the farmers, tradesmen, and merchant classes and their social status gained some elevation, yet they remained the class of producers for the support of a government in which they had no voice.

In a word, Japan, under the feudal system, can be considered as having been divided into so many states with complete political autonomy within the respective domains of the feudatories as to legislative, administrative, judicial, and military affairs. Every institution was in its nature local and heterogeneous. There existed no single system of law or finance that was common to the nation.

WHAT THE VOLUNTARY SURRENDER OF PRIVILEGES BY THE SAMURAI MEANT

The restoration of the Imperial power meant the unification of the governmental powers, and the unification of the governmental powers meant the surrender of the powers, rights, privileges, properties, and what-not possessed by the feudatories and Samurai, because, without a complete abdication by the feudal lords and vassals of their prerogatives, a real unification of the governmental powers and the restoration of the Imperial authority was impossible. This meant to the feudal lords the surrender of that exalted position which resembled that of an independent potentate, and taking rank not only among their former vassals, but even with the tradesmen and merchants, who, in their eyes, had no place in the political and social existence of Japan. This abandonment of the high position involved the surrender of the landed property which had been inherited from time immemorial. The surrender of the prerogatives and property by the feudal chiefs meant in the case of the Samurai, a class in whose hands the real political power of the nation rested, the loss of the very means of subsistence to the 2,000,000 of the cream of the population of the nation; it meant the dispossession of their military employment, the privilege of wearing a sword, the mark of a gentleman, the cherished pride of this class; it meant to them that they had to throw away all that distinguished this order from time immemorial and to step down into the company of the peasant or the merchant and to join the ranks of common bread-winners, whom they despised; and what was the most marvelous aspect of the situation was that this grand *coup d'etat* could be carried out only by the efforts of those who had to suffer the consequences of the change.

JAPAN IS TODAY MORE DEMOCRATIC THAN THE MOST DEMOCRATIC OF EUROPEAN NATIONS

And yet it was done. Japan of today is perhaps more democratic in its institutions than the most democratic of European nations. Although the descendants of the old Samurai still retain their ancient class name, it has only a historic value in the political and social life of Japan of today. The spirit of equality, liberty, and fraternity pervades the institutions of Japan.

It is almost beyond human power to fully comprehend this most dramatic incident in history, which resulted in the surrender of fiefs to the Mikado. No annals of mankind record an incident which appears more inconsistent with the course that human experience would have predicted. Many explanations have been attempted. The weakened condition of the Tokugawa government, selfish motives of some ambitious southern Daimios, personal motives of various kinds, the inability of appreciating the real consequences of the change on the part of the Daimios and Samurai, are mentioned among the causes. I do not hesitate to say, however, that such a grand achievement in human history cannot be caused by such petty and selfish motives. It was solely and entirely due to the lofty spirit of patriotism and loyalty which found ready echo for action in the spirit of self-sacrifice nurtured for centuries under the rigid feudal system.

From the following words of Captain Brinkley, an eminent authority on Japanese history, you will get some idea of the spirit of self-sacrifice: "It had so long been the bushi's habit to associate great deeds with some form of self-immolation that he had learned to regard the latter as a kind of finger-post to the former. History shows that the romantic element occupies a prominent place in Japanese character, and that the educated classes can always be led into feverish pursuit of an idea which appeals to their sense of moral nobility. The atmosphere was full of loyalty and patriotism in 1869. The mood of the nation was exalted. Any one hesitating for plainly selfish reasons to follow a course apparently essential to the new order of things, and sanctioned by the example of the great southern clans, would have seemed to forfeit the right of calling himself a Samurai."

THE IMMEDIATE CAUSE OF THE SAMURAI'S SELF-SACRIFICE

Such was the spirit of the people of the time in whose hands rested the destiny of the Empire. But what was the immediate cause which called forth such a marvelous display of the extreme degree of self-sacrifice? It was the advent of black ships to the coast of Japan. It is true that the long peaceful reign of the Tokugawa government resulted in undermining its strength and power, which infused into some ambitious feudal barons the spirit of revolution. It is true that toward the end of that government the spirit of loyalty to the throne received an impetus from the advocates of the Imperial authority, but were it not for the appearance of the black ships of the various western nations along the coast of Japan and the pressure brought upon her by those powers Japan would never have seen the day of restoration.

Long before the formal opening of the country to the world at large a certain sort of intercourse was established with the Dutch, who had been permitted to reside at Deshima, a little island lying near Nagasaki. Through the Dutch settlers the glimpse of the West was being introduced into Japan in a certain measure. What overawed the people of Japan the most at the time were the black ships which moved about on the surface of the water as freely as would a wagon on land, emitting big volumes of black smoke and raising hideous noises. It was a marvel to them that these sailing ships with triangular sails could go against the head wind. Through the Dutch they heard of the greatness of England and France. The Russian fleet made occasional appearances in the northern islands, perpetrated havoc among the inhabitants, and left letters of threat. The following extract from Mr Aston's article on "Russian Descents on Japan" is interesting in this connection:

AN EARLY VISIT FROM RUSSIA

"From Ruitaka the Russians crossed over to Rushin, a small island near the entrance to Soya (Japanese) harbor. Here they found four junks, mostly laden with stores for the Soya garrison. These junks they rifled and burnt, carrying off, amongst other booty, a ten-pounder bronze cannon captured by Taikosama from the Koreans. The officers in charge of the junks reported to their government that they had been wrecked in the storm at Rushin. The Russians sent ashore the prisoners taken at Kushunkotan and Itorup. To one of them was entrusted a message to the Japanese authorities, which was taken down in Japanese and ran as follows:

"'*To the Governor of Matsumaye:*

"'The distance between Russia and Japan being but small, our Emperor sent his officers across the sea to request that trade between the two countries might be permitted. If due inquiry had been made and a treaty of commerce concluded, all would have been well, but although our officers went repeatedly to Nagasaki they were sent away without an answer. Then things took an unpleasant turn, and our Emperor commanded us to give you a specimen of his power in return for your refusing to listen to his first request. If you persist in refusing his offers, we will take all your northern territory from you, and if possible get an answer out of you in that way. The red men (Russians) can always come to Saghalien and Itorup and chase you about. If you comply with our wishes, we shall always be good friends with you. If not, we will come again with more ships and behave in the same way as we have done before this year.

"'OROSHIYA (RUSSIA).'"

About the time when Commodore Perry entered the waters of Japan, in March, 1853, and his return there, in February, 1854, the rumors of trouble between the Chinese and European powers were being constantly received through the Dutch by the statesmen of Japan with the greatest concern. The incessant and increasing visits of the black ships and the persistent demands of the various powers to open the country to the intercourse of the world deeply occupied the minds of the thinking population of Japan. They never had those awe-inspiring black ships on their side, nor had they any of those magical sailing ships which could steer their way against the head wind. They never heard before such a tremendous roaring of cannon as that sounded on those monster vessels. The years following the conclusion of the first international treaty of Japan, in 1854, are marked with the tremendous agitation over all the Empire, and the question of national defense was a matter of paramount importance.

The Tokugawa government, by the pressure so tactfully brought upon them and by the persuasion so skillfully administered by the American envoy, were finally compelled to accede to his demands, but public opinion was strongly opposed to the opening of the country. It is impossible to say whether those people who advocated the policy of exclusion really believed in its practicability or not, but it was a policy which had been followed during several centuries, and they cherished the quiet peace of seclusion. "Respect the throne and expel the barbarians" was the byword by which public opinion was guided. The pressure of public opinion and the difficulty of the situation compelled the Tokugawa government to openly recognize the authority of the Emperor and the Imperial court, around which now thronged the Samurai of the great and ambitious clans of Satsuma and Choshiu, and, further, to submit the treaty to the Emperor and refer the same to public discussion by the Daimios. It was an act which found no precedence in the history of the Tokugawa government. Both the Emperor and the Daimios vetoed the action of the Tokugawa government.

THE MARTYRDOM OF LORD II

Heavy as they felt the foreign pressure on one hand, the Tokugawa government could not ratify the American treaty on account of the strong internal opposition. There appeared a martyr in the person of Ii Kamon-no-Kami, who assumed the portfolio of the premier of the Tokugawa government at this critical moment, and who, in defiance of the Imperial order and the public opinion, ratified that American treaty. He was a real martyr, because soon after he fell by the hands of assassins, being regarded by the opposition as a traitor to the country. Whatever might have been the popular verdict upon his conduct at the time, it is clear now that he acted in that spirit, as is explained in the following poem of his own:

"As beats the ceaseless wave
On Omi's strand
So breaks my heart for my beloved land."

Agitation was intensified by this daring act of Lord Ii. A revolution followed, and the Tokugawa shogunate, which prospered during two centuries and a half, and under whose wise and peaceful administration the arts of peace made such advances as to have surprised the world, finally came to an end, and the present Emperor, Mutsuhito, was proclaimed on the 27th of March 1867, as the sole and absolute ruler of Japan. At the same time the feudal system, which was originated seven centuries ago, was blotted out from the pages of Japanese history by the voluntary surrender by the shogun and Daimios of all the rights, privileges, and properties descended from their illustrious ancestors or earned by their own distinguished exploits. This noble deed, which involved such an enormous sacrifice, was entirely due to the public spirit of the men who had been convinced by the turn of events that the only way of defending the country against the external aggression was to bring about the unification of the administration and centralization of power—a condition which was possible only on the absolute abolition of the regime then existent.

THE OATH OF ACCESSION

The Emperor, on his accession to the throne, proclaimed the following articles of oath, thus solemnly laying the foundation for the grand policy of new Japan:

"1. A broadly based deliberative assembly should be convened for the purpose of conducting state affairs in conformity with public opinion.

"2. High and low should unite their minds and vigorously carry out the grand affairs of the state.

"3. Civilians and military, as well as common people, should be allowed to freely carry out their minds' aspirations, and their spirit of progress should not be suffered to be hampered.

"4. Cast off the uncivilized customs of the past and let us found our principles on the laws of nature.

"5. Seek knowledge in the world and strengthen the foundation of the Empire.

"Desiring to introduce the reforms unparalleled in the history we, ahead of all our subjects, took the oath before the gods of heaven and earth and solemnly established the fundamental policy for the Empire and endeavor to lay the foundation for the way of promoting the happiness and prosperity of the people. You should likewise share the same principle and coöperate with us."

CHAOS FOR A TIME

The tasks attendant to the consummation of this grand revolution, which shook to the heart the political and social organizations of the country, taxed the wisdom, energy, forbearance, and self-sacrifice of the patriots of Japan in a manner almost unknown in the history of mankind. An anti-foreign, conservative, anarchistic, and destructive spirit pervaded all classes of the people. The Samurai of different Daimios severed their allegiance with their former lords in order to carry out their own conviction by the use of swords and violent means. Misunderstandings, jealousies, and intrigues were rampant, and assassinations were of common occurrence. In a word, the whole Empire was in a state of chaos. To tame these unruly elements, to infuse order and harmony among them, and to graft on them an order and regime entirely foreign to the soil, and to develop them to the condition in which they are now within the short space of the last 37 years is the grandest of the achievements that man has ever accomplished.

SOME OF THE PROMOTERS OF THE GREAT CHANGE

The men who conceived and achieved this unique revolution were chiefly Samurai of inferior grade, without official rank or social standing. The most prominent of them do not exceed 55 in number, and among them only 13 are aristocrats; but these latter played only a secondary part in the movement, with the exception of Sanjo and Iwakura. The other 42 men were all young Samurai. The average age of the 55 men did not exceed 30 years.

The four great clans of southern Japan—Satsuma, Choshiu, Tosa, and Hizen—promoted the revolution, and the prominent persons of the present era came chiefly from the Samurai of these four clans, and more particularly from those of Satsuma and Choshiu. Many great statesmen of this period have already departed from this world, but such names as Saigo, Okubo, Kido, Iwakura, and Sanjo cannot justly be passed over without mention. Still alive and actively taking part in the affairs of state are Marquis Ito, who was one of the younger members among the promoters of the revolution and a statesman of the greatest constructive genius of the Meiji era, whose name is connected with nearly every great work in the history of new Japan, and whose legislative career is crowned by the drafting of the constitution; Marquis Yamagata, to whom the nation is indebted for the organization of the efficient army now fighting in Manchuria and to whom was entrusted the chief command of the Imperial army against China in 1894; Marquis Oyama, a most genial, loyal, and brave general and statesman, now leading the Imperial army in Manchuria; Count Inouye, a resourceful, undaunted, strong-willed statesman, who held the portfolio of foreign affairs for nearly ten years at the most troublous time of Japan's foreign relations; Count Matsugata, an eminent financier, whose name has covered the title page of the history of the gold-standard system of Japan; Count Okuma, now leader of the progressive party and a politician of the most subtle, versatile, and vigorous intellect; Count Itagaki, formerly leader of the liberal party and the most ardent advocate of the constitutional government. The careers of these men are full of incidents most entertaining and instructive, but I have no time to dwell upon them here.

HIS MAJESTY THE EMPEROR MUTSUHITO

It would be improper to close this speech without some allusion to our most beloved and revered sovereign, who was suddenly called to the actual duties of the head of the nation at the age of sixteen and at the most turbulent period in Japan's history. During the last thirty-seven years of his most marked and enlightened reign he has given the nation the enjoyment of all the best fruits of the civilization of the West, and, above all, has raised the country, in the face of the immense obstacles, from the position of an insignificant oriental state to that of a formidable unit in the comity of nations. Much need not be said about his public acts. Facts are too abundant and conspicuous to make explanation necessary.

His Majesty the Emperor Mutsuhito was born on the 3d of November, 1852, and ascended the throne in February, 1867. He is a person above the ordinary Japanese height, with large, wide-set eyes and broad forehead. He is robust in health, studious in habit, kind and sympathetic in sentiment, and strong and loyal in character. Out of the civil list, which is only $1,500,000 a year, he supports, borrowing the words of Captain Brinkley, "the whole of the princely families, including that of the Crown Prince; he accompanies all patents of nobility with handsome sums; he makes liberal allowances to cabinet ministers by way of supplement to their salaries; he pays the honoraria that goes with orders and medals; he gives large amounts to charitable purposes, many of which escape the public attention altogether, and he devotes considerable sums to the encouragement of art." The $65,000 which were given for the entertainment of the soldiers on the 11th of February last, the occasion of the anniversary of the foundation of the Empire by the first Emperor, Jimmu, came out of the Imperial purse. "His manner of life is simple and frugal, and it may be truly said that his record does not show one act unworthy of the reverence with which his subjects regard him." Indeed, the people of Japan love, honor, and respect His Majesty, who has so faithfully and assiduously fulfilled the oath which he took on his accession to the throne.

I have heard sometimes certain sarcastic remarks on the reports to the Emperor from the generals and admirals on the field, which generally end with the phrase "This glorious success is due to the virtue of your Majesty." To your ears this may sound strange. Foreigners may take it as a mere form of oriental flattery; but to our mind there is nothing more truthful and sincere. In Japan loyalty and patriotism are interchangeable terms. Were it not for the devotion of men and officers to "Our Lord and country," no admiral or general, however great a military genius he may be, could ever achieve the glorious successes which crowned their efforts during the present war.

The sentiment expressed in our national hymn that

"May our Lord's dominion last
Till a thousand years have passed
Twice four thousand times o'ertold.
Firm as changeless rock, earth-rooted,
Moss of ages uncomputed,"

truthfully reflects the hearts' wishes of the fifty millions of his most loyal subjects.

OUR SMALLEST POSSESSION—GUAM

BY WILLIAM E. SAFFORD

Mr Safford was formerly a lieutenant in the U. S. Navy, and his cruises took him to many of the islands of the Pacific, where he made many notes and collections. He so felt the want of a handy volume describing the luxuriant tropical plants, a large number of which are very useful, that when he later joined the botanical staff of the Department of Agriculture he resolved to write a book on the subject. This book, a volume of 420 pages, profusely illustrated, and with an introduction by Mr Frederick V. Coville, Curator of Botany, has just been published by the U. S. National Museum under the title "The Useful Plants of the Island of Guam." In it the author describes the principal plants used for food, fiber, oil, starch, sugar, and forage in our tropical islands, and he further includes much interesting information about the people of Guam and their descendants. The following article is based on this report:

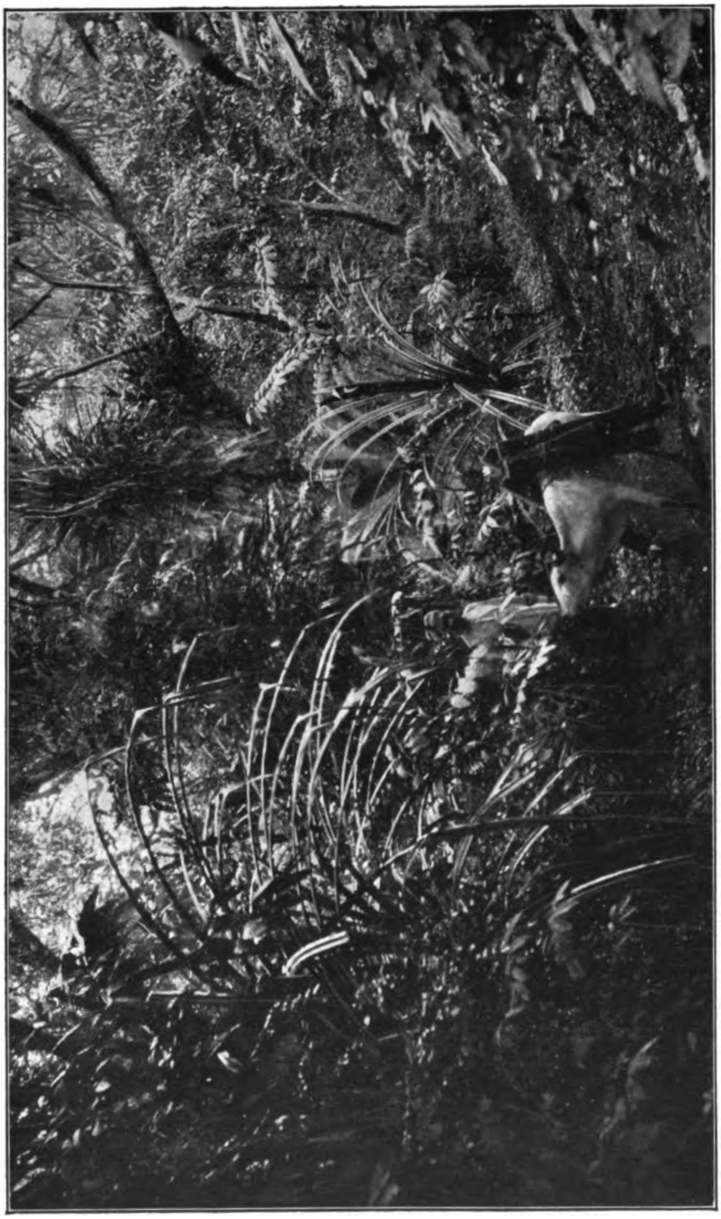
GUAM is considerably larger than Tutuila, the most important of the Samoan Islands owned by the United States, though its chief port, San Luis de Apra, cannot be compared with Pango-Pango, our naval station in the South Pacific, and perhaps the finest harbor in the world. The advantage of Guam as a station for repairs and supplies is evident, forming, as it does, a stopping place for vessels between Hawaii and the Philippines. Its strategic importance has been greatly enhanced since it has been made the landing place of the trans-Pacific cable, and the completion of the Panama Canal will make it still more valuable to our government.

The extreme length of the island from north-northeast to south-southwest is 29 statute miles. Its width is from 7 to 9 miles, narrowing at the middle to a neck only 4 miles across. On the northwest coast of this neck is situated Agana, the capital, a city of over 6,000 inhabitants. The entire population of the island, according to the census of 1901, was 9,676.

THE COMING OF MAGELLAN

The Island of Guam was discovered on March 6, 1521, by Magellan, after a passage of three months and twenty days from the strait which bears his name. An account of the privations and suffering of his crew, many of whom died on the way across the hitherto unexplored ocean, is graphically given by Antonio Pigafetta, Magellan's historian. He describes how the expedition arrived at Guam with the crews suffering from scurvy and in a starving condition, having been compelled on the passage to eat rats and even the leather from off the standing rigging to keep soul and body together. In comparison with Magellan's feat of crossing the vast Pacific, the first voyage of Columbus from the Canary Islands to the West Indies seems insignificant. The natives of Guam came to meet the Spaniards in strange "flying praos" (canoes provided with outriggers and triangular sails of mats). The Spaniards had dropped anchor, furled their sails, and were about to land, when it was discovered that a small boat which rode astern of the flagship was missing. Suspecting the natives of having stolen it, Magellan himself went ashore at the head of a landing party of 40 armed men, burned 40 or 50 houses and many boats, and killed seven or eight natives, male and female. He then returned to his ship with the missing boat and immediately set sail, continuing his course to the westward.

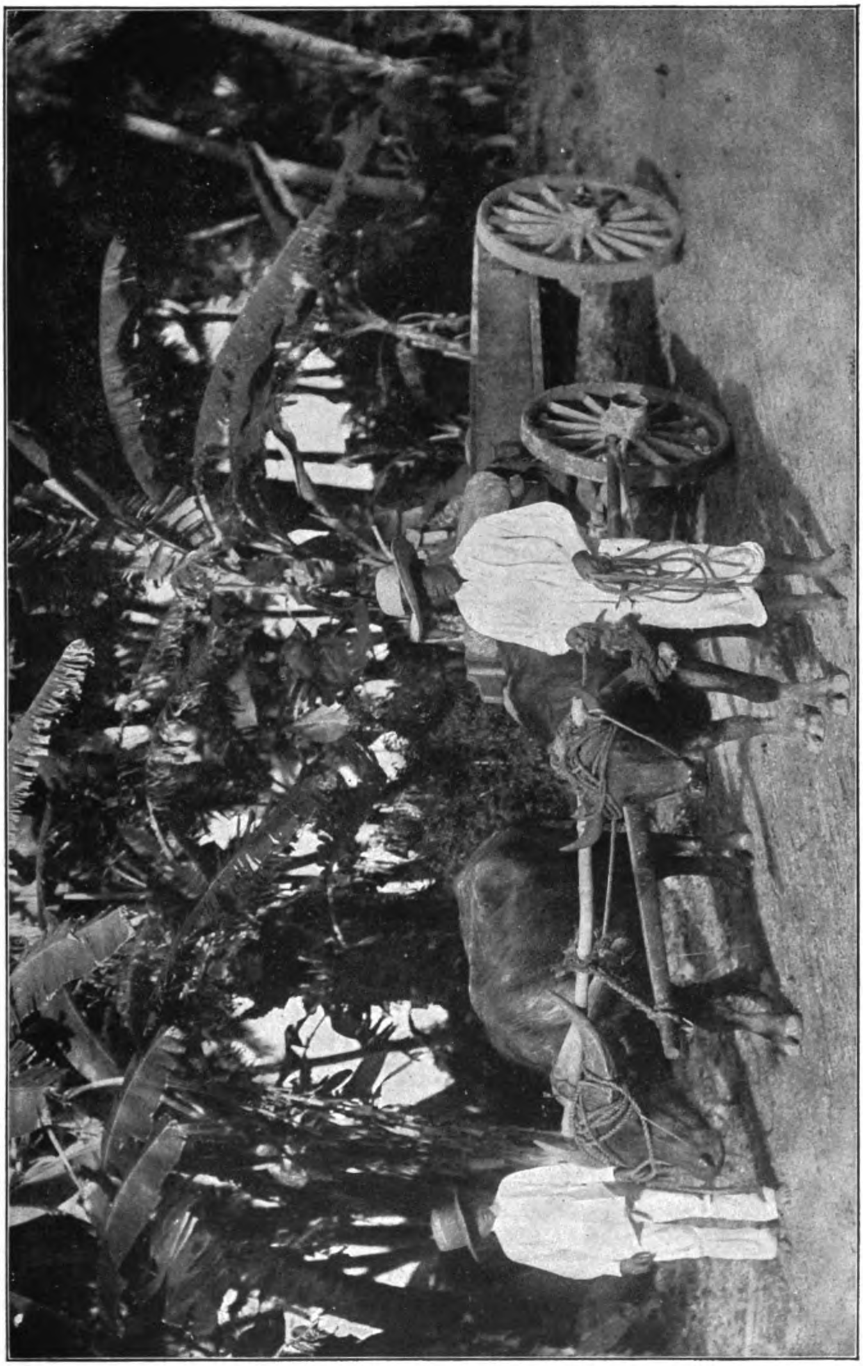
The natives did not fare much better at the hands of later visitors. Missionaries came in 1668.



From W. E. Safford, U. S. National Museum

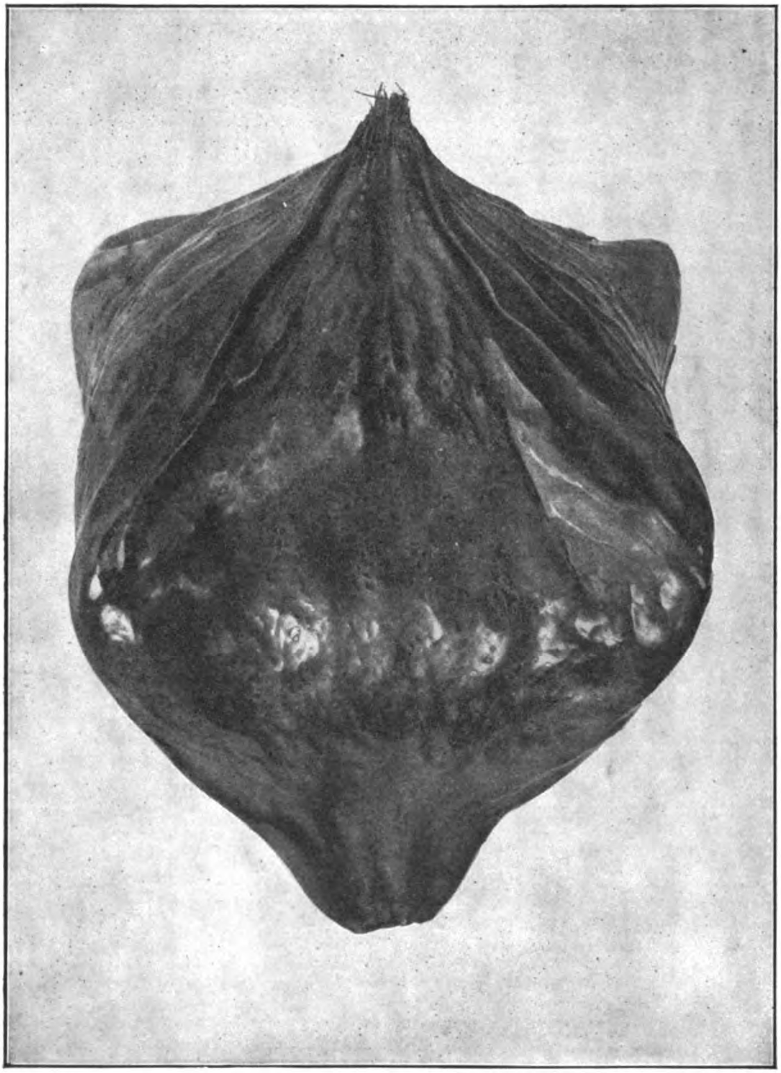
The Forest, Island of Guam

Showing epiphytal vegetation (airplants which grow on other plants but do not derive their nourishment from them). The young carabao is carrying water in bamboo water jugs.



From W. E. Safford, U. S. National Museum

On the Main Road Across the Island of Guam



A Fish Intoxicant; the Fruit of the *Barringtonia speciosa*, Natural Size

The natives of Guam, and of a number of other tropical islands of the Pacific, use this fruit to stupefy fish (see opposite page). The species does not occur in the Hawaiian Islands, but it is found in the Malay Archipelago, the Andaman Islands, and Ceylon. The fruits are light, and as the tree grows down to the very edge of the sea, they often fall into the water and are carried by currents and cast upon other shores. The dried fruits are used by the natives as floats for their nets.

Though Guam lies within the tropics, its climate is tempered throughout the greater part of the year by a brisk trade wind blowing from the northeast and east. Its mountains are not high enough to cause marked differences in the distribution of rain on the island, and the island is not of sufficient extent to cause the daily alternating currents of air known as land and sea breezes. Generally speaking, the seasons conform in a measure with those of Manila, the least rain falling in the colder months or the periods called winter by the natives, and the greater rainfall occurring in the warm months, which are called summer by the natives.

The mean annual temperature is about 80° F. in December, the coldest month, to 82° F. in May and June, the hottest months. The highest absolute temperature recorded in 1902, 90° F., occurred in June and July, the lowest, 66° F., in December.

Though the mean monthly temperature varies only 2° on either side of the mean annual temperature, yet the "winters" of Guam are so definitely marked that certain wasps which during the summer make their nests in the open fields among the bushes invade the houses of the people at that season and hibernate there.

The forest vegetation of Guam consists almost entirely of strand trees, epiphytal ferns, lianas, and a few undershrubs. The majority of the species are included in what Schimper has called the Barringtonia formation. The principal trees are the wild, fertile breadfruit, *Artocarpus communis;* the Indian almond, *Terminalia catappa;* jack-in-the-box, *Hernandia peltata*, and the giant banyan.

CATCHING FISH WITH INTOXICANTS

The fruit of another common tree (*Barringtonia speciosa*) the natives use to stupefy fish.

The fruit is pounded into a paste, inclosed in a bag, and kept over night. The time of an especially low tide is selected, and bags of the pounded fruit are taken out on the reef next morning and sunk in certain deep holes in the reef. The fish soon appear at the surface, some of them lifeless, others attempting to swim, or faintly struggling with their ventral side uppermost. The natives scoop them in their hands, sometimes even diving for them. Nothing more striking could be imagined than the picture presented by the conglomeration of strange shapes and bright colors—snake-like sea eels, voracious lizard-fishes, gar-like houndfishes, with their jaws prolonged into a sharp beak; long-snouted trumpet-fishes, flounders, porcupine-fish, bristling with spines; squirrel-fishes of the brightest and most beautiful colors—scarlet, rose color and silver, and yellow and blue; parrot-fishes (Scarus), with large scales, parrot-like beaks, and intense colors, some of them a deep greenish blue, others looking as though painted with blue and pink opaque colors; variegated Chaetodons, called "sea butterflies" by the natives; trunkfishes with horns and armor, leopard-spotted groupers, hideous-looking, warty toadfishes, "*nufu*," armed with poisonous spines, much dreaded by the natives, and a black fish with a spur on its forehead.

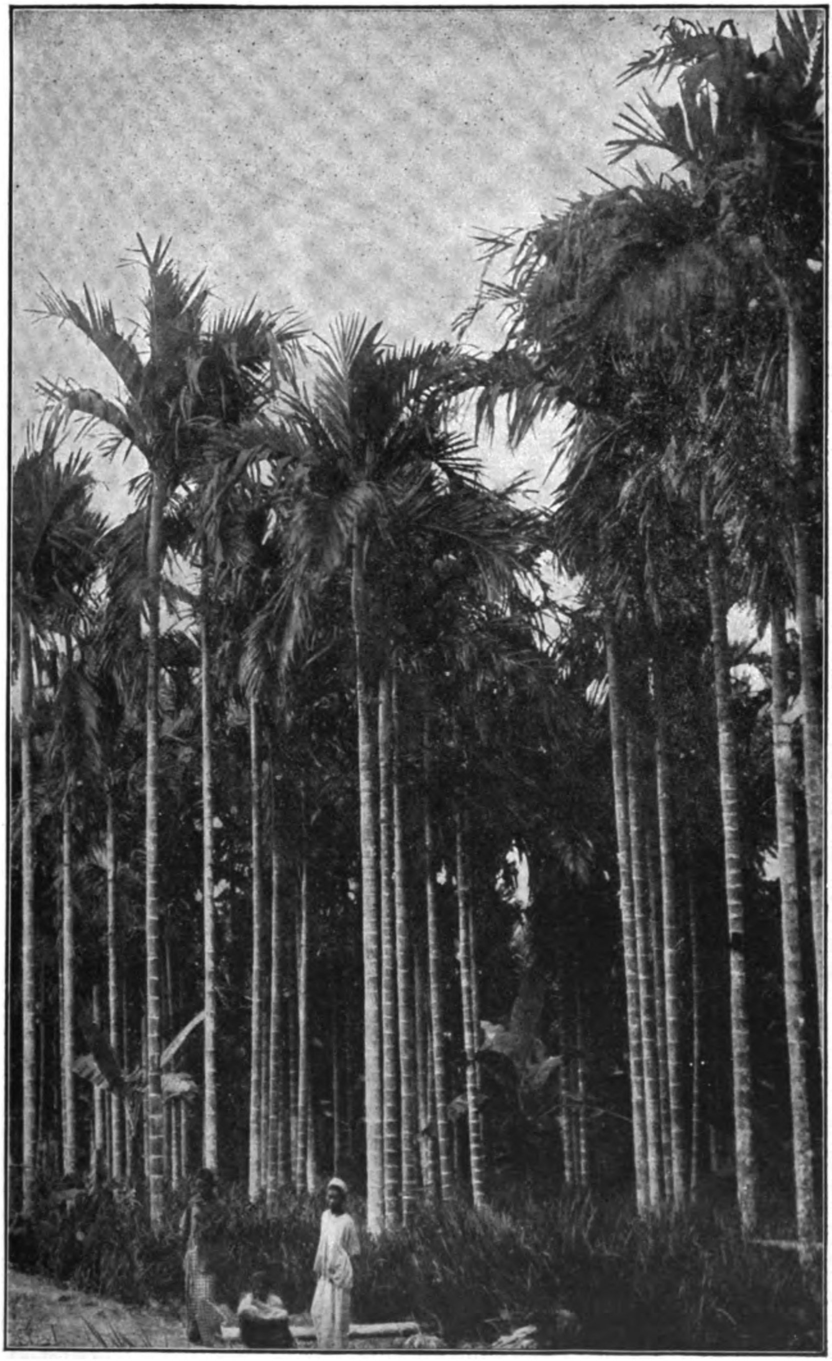
As many young fish unfit for food are destroyed by this process, the Spanish government forbade this method of fishing, but since the American occupation of the island the practice has been revived.

In the mangrove swamps when the tide is low hundreds of little fishes with protruding eyes may be seen hopping about in the mud and climbing among the roots of the Rhizophora and Bruguiera. These are the widely spread *Periophthalmus koelreuteri*, belonging to a group of fishes interesting from the fact that their air bladder has assumed in a measure the function of lungs, enabling the animal to breathe atmospheric air.

From W. E. Safford, U. S. National Museum

A Coffee Tree in Full Bloom, Island of Guam

Every family on the island grows its own coffee



From W. E. Safford, U. S. National Museum

Betel-nut Palms

The nut is greatly esteemed by the natives of Guam, who chew it with the leaf of the betel pepper. It imparts a red color to the saliva, so that the lips and teeth appear to be covered with blood, and in time become blackened. In Guam betel chewing is a matter of etiquette at all wedding assemblies, festivals, and funerals.

THE NATIVES AS THE SPANIARDS FOUND THEM

Both sexes were expert swimmers, and were as much at ease in the water as on land. As they threw themselves into the sea and came bounding from wave to wave they reminded Pigafetta of dolphins. The men were good divers. Legazpi states that they would catch fish in their hands. The children accompanied their parents while fishing, and were so expert in the water that Garcia declared that they appeared rather fish than human beings.

According to the testimony of early writers, their houses were high and neatly made and better constructed than those of any aboriginal race hitherto discovered in the Indies. They were rectangular in shape, with walls and roofs of palm leaves curiously woven. They were made of cocoanut wood and palo maria (*Calophyllum inophyllum*), and were raised from the ground on wooden posts or pillars of stone. In one of the narratives of the Legazpi expedition it is said that some of the houses supported on stone pillars served as sleeping apartments; others built on the ground were used for cooking and other work. Besides these, there were large buildings that served as storehouses for all in common, wherein the large boats and covered canoes were kept. "These were very spacious, broad, and high, and worth seeing." As described by the missionaries, some of the houses had four rooms or compartments, with doors or curtains of mats, one serving as a sleeping-room, another as a store-room for fruits, a third for cooking, and a fourth as a workshop and boat-house.

They were a happy, careless people, fond of festivities, dancing, singing, story telling, and contests of strength and skill, yet sufficiently industrious to cultivate their fields and garden patches, build excellent houses for their families, braid mats of fine texture, and construct canoes which were the admiration of all the early navigators. They were much given to buffoonery, mockery, playing tricks, jesting, mimicry, and ridicule, offering in this respect a striking contrast to the undemonstrative Malayans.

That they were naturally kind and generous is shown by their treatment of shipwrecked sailors cast upon their shores and their reception of the early missionaries who founded the first colony on the island. These missionaries complained that they could not make the natives take life seriously, saying that what they promised one minute they forgot the next. On the other hand, the missionaries spoke of the remarkable intelligence shown by the children in learning the Christian doctrine, the moderation of the natives in eating, and the absence of intoxicants. Their sense of hospitality was very marked Women were treated with consideration, and had greater authority than in almost any other land hitherto known.

THE PRESENT PEOPLE OF GUAM

The natives of Guam are, as a rule, of good physique and pleasing appearance. Owing to their mixed blood, their complexion varies from the white of a Caucasian to the brown of a Malay. Most of them have glossy black hair, which is either straight or slightly curly. It is worn short by the men and long by the women, either braided, coiled, or dressed after the styles prevailing in Manila.

Though the natives of Guam are naturally intelligent and quick to learn, little has been done for their education, and many of them are illiterate. The college of San Juan de Letran was founded by Queen Maria Anna of Austria, widow of Philip IV, who settled upon it an annual endowment of 3,000 pesos. Through misappropriation and dishonesty the annual income of the college gradually dwindled to about

1,000 pesos. The greater part of this was absorbed by the rector, who was usually the priest stationed at Agana, and by the running expenses of the school, which were the subsistence and wages paid to janitor, porter, steward, doctor, and the lighting of the building.

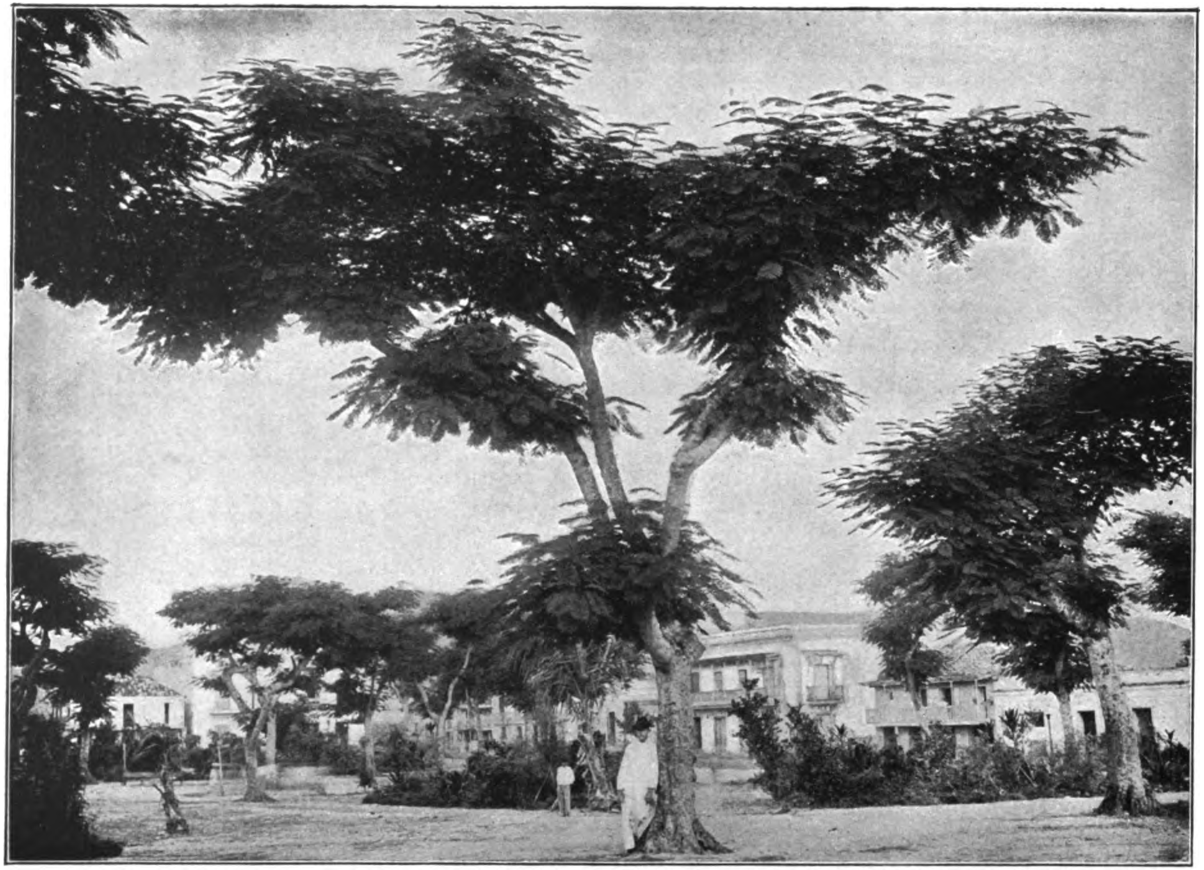
The people are essentially agricultural. There are few masters and few servants on the island. As a rule the farms are not too extensive to be cultivated by the family, all of whom, even the little children, lend a hand. Often the owners of neighboring farms work together in communal fashion, one day on A's corn, the next day on B's, and so on, laughing, singing, and skylarking at their work and stopping whenever they feel so inclined to take a drink of tuba from a bamboo vessel hanging to a neighboring cocoanut tree. Each does his share without constraint, nor will he indulge so freely in tuba as to incapacitate himself for work, for experience has taught the necessity of temperance, and every one must do his share if the services are to be reciprocal. In the evening they separate, each going to his own rancho to feed his bullock, pigs, and chickens. After a good supper they lie down for the night on a pandanus mat spread over an elastic platform of split bamboo.

None of the natives depends for his livelihood on his handiwork or on trade alone. There are men who can make shoes, tan leather, and cut stone for building purposes, but such a thing as a Chamorro shoemaker, tanner, stone mason, or merchant who supports his family by his trade is unknown. In the midst of building a stone wall the man who has consented to help do the work will probably say, "Excuse me, Señor, but I must go to my rancho for three or four days; the weeds are getting ahead of my corn." And when lime is needed the native to whom one is directed may say, "After I have finished gathering my cocoanuts for copra I will get my boys to cut wood and gather limestone to make a kiln. Never fear, Señor, you shall have your lime within six weeks." On one occasion a blacksmith was delayed two weeks in making a plow owing to the fact that the man from whom he got his charcoal had been so busy supplying visiting vessels with fruits and vegetables that he could not find time to burn it.

THE MILCH GOAT

THE Department of Agriculture has been so successful in its experiment of introducing the beautiful Angora goat into this country, by means of which an industry worth several million dollars has been created, that it is now trying to arouse an interest in the milch goat. Every traveler in Europe is familiar with the sturdy little animal, which does not hesitate to climb to the attic of a dwelling and when several stories up allow itself to be milked. It is estimated that Germany owns about 3,000,000 of these animals, that they are worth about $12,000,000, and yield milk and kids each year worth $36,000,000, or three times their original value.

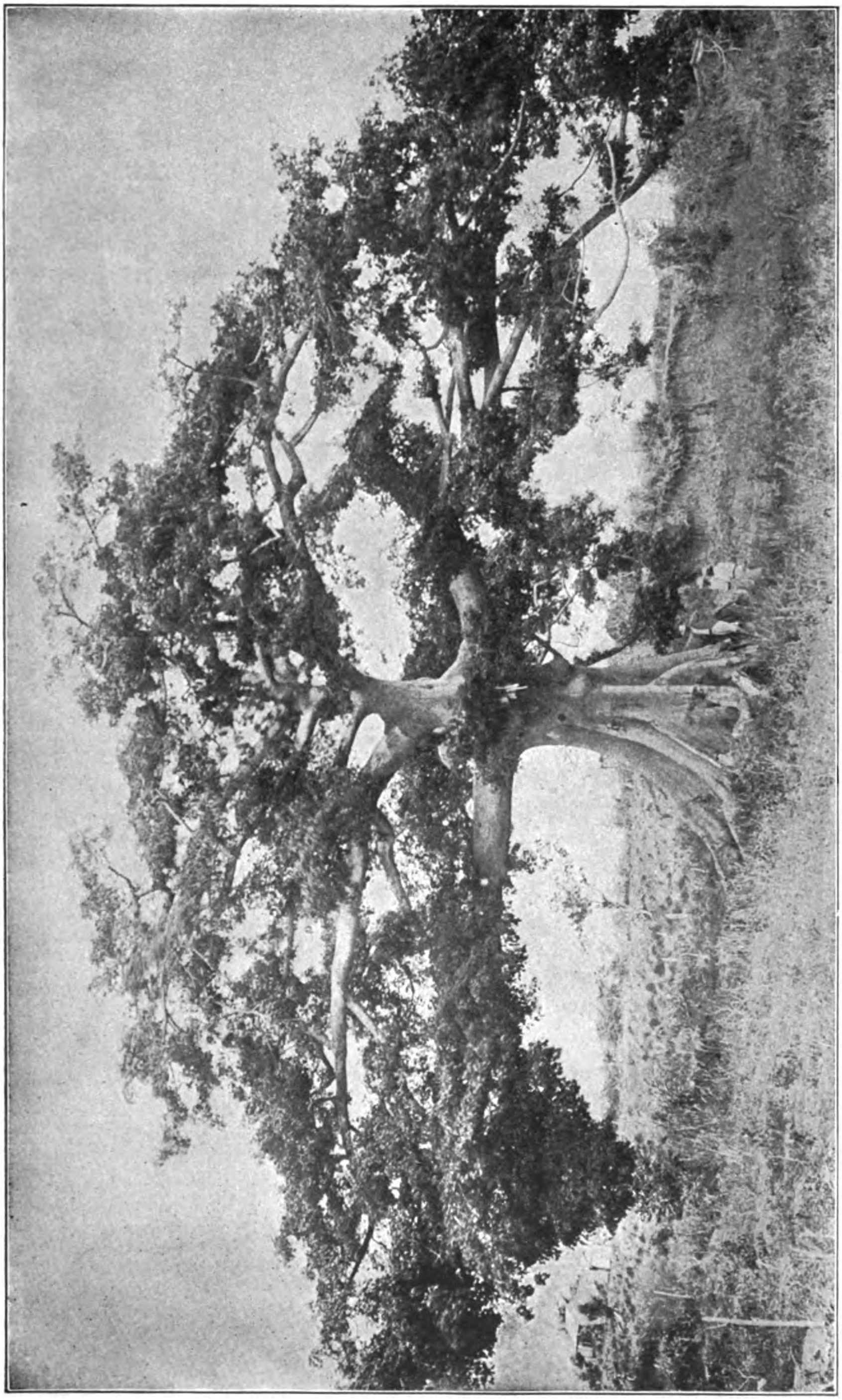
A good goat gives four or five quarts of milk daily. It can eat many kinds of herbage, so that its keep is not a difficult nor expensive problem. The milk is believed to be richer and freer of tuberculosis than cow's milk, and if kept clean is not odorous. Families living in crowded suburbs may find a solution of the milk problem in keeping milch goats.



From O. F. Cook and G. N. Collins, U. S. National Museum

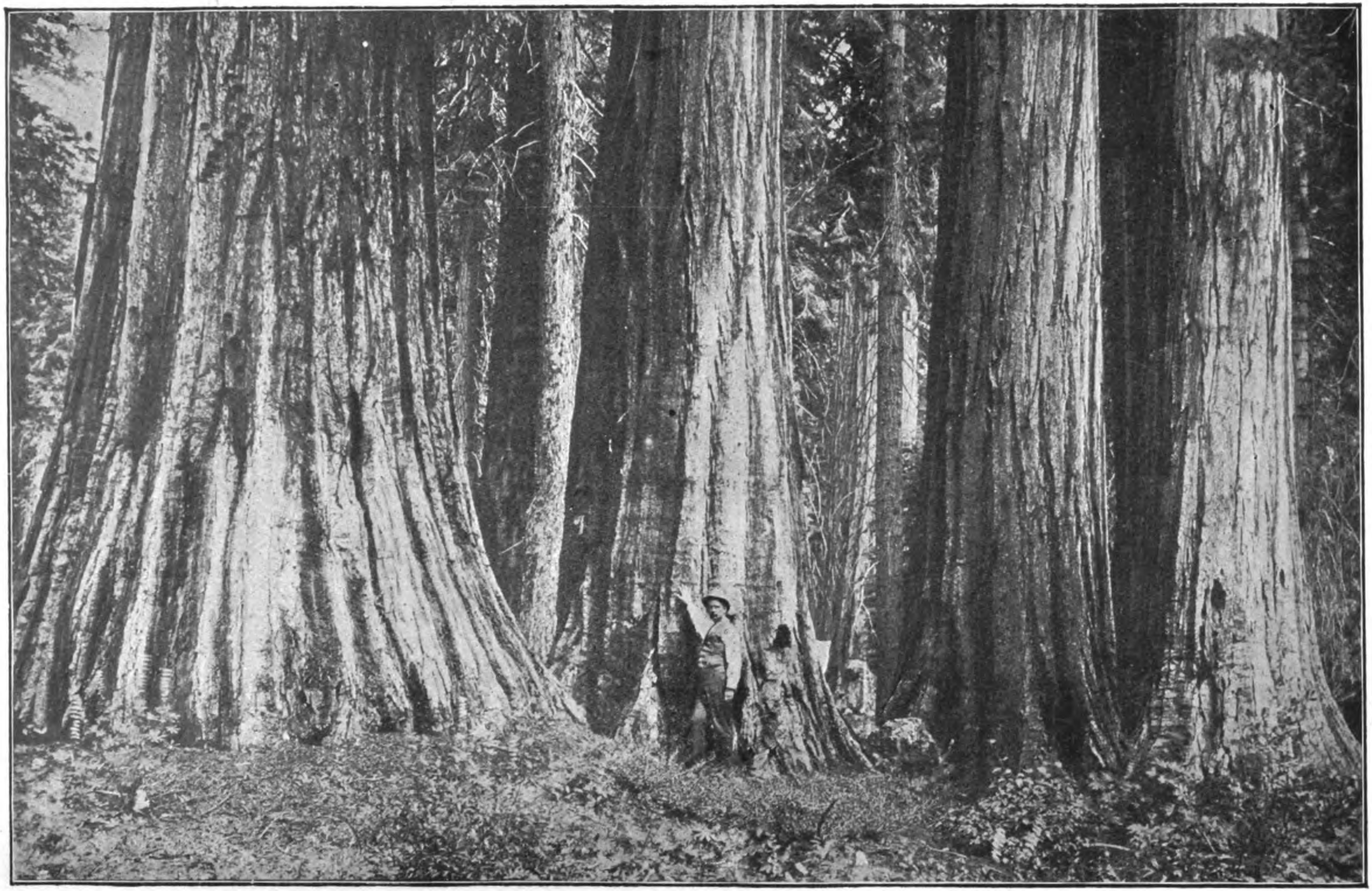
Flame Tree in the Plaza Caguas, Porto Rico

This beautiful tree is a native of Madagascar, but is now used to adorn many plazas throughout the tropics. The large finely-divided leaves appear almost as delicate as maiden-hair fern fronds, while the spreading branches make it an excellent shade tree.



A Splendid Specimen of the Ceiba Tree, or "Silk Cotton," near Ponce, Porto Rico

The Porto Ricans use the cotton covering the seeds to make beds and pillows. This and the preceding illustration are from a report on "The Economic Plants of Porto Rico," by Messrs O. F. Cook and G. N. Collins, published by the U. S. National Museum. The bulletin includes about 3,000 entries of weeds, shrubs, trees, fruits, and vegetable plants which furnish some article of use.



From Henry Gannett, U. S. Geological Survey

A Group of *Sequoia gigantea*, Mariposa Grove, California

GEOGRAPHIC NOTES

NATIONAL GEOGRAPHIC SOCIETY

At the last meeting of the National Geographic Society for 1904–'05 President Willis L. Moore announced that the membership of the Society had reached 5,000, making the National Geographic Society the largest geographical society in the world. Nearly every section of the globe is represented in this membership.

The members are reminded that the Society will always welcome from them notes of geographic development and interest. Members are also urged to send to the Society for preservation in its library copies of photographs taken by them, either at home or on their travels, that have a geographic value.

Some features which the National Geographic Society will publish in its Magazine during the next several months are:

An article on "Storms and Weather Forecasts," illustrated with 20 charts, showing storm tracks, hot and cold waves, etc., by Dr Willis L. Moore, Chief United States Weather Bureau and President of the National Geographic Society; an address on "The Philippines," by the Secretary of War, Hon. William H. Taft, with a new map of the Philippines, 23 by 36 inches and in

From George Fayette Thompson, U. S. Department of Agriculture

A Group of Milch Goats. (See page 237)

three colors; an address on "The Panama Canal," by Admiral C. M. Chester, Superintendent of the Naval Observatory; an address on "The Evolution of Russian Government," by Dr Edwin A. Grosvenor, Professor of International Law in Amherst College; an address on "The Commercial Prize of the Orient," by Hon. O. P. Austin, Chief of the Bureau of Statistics.

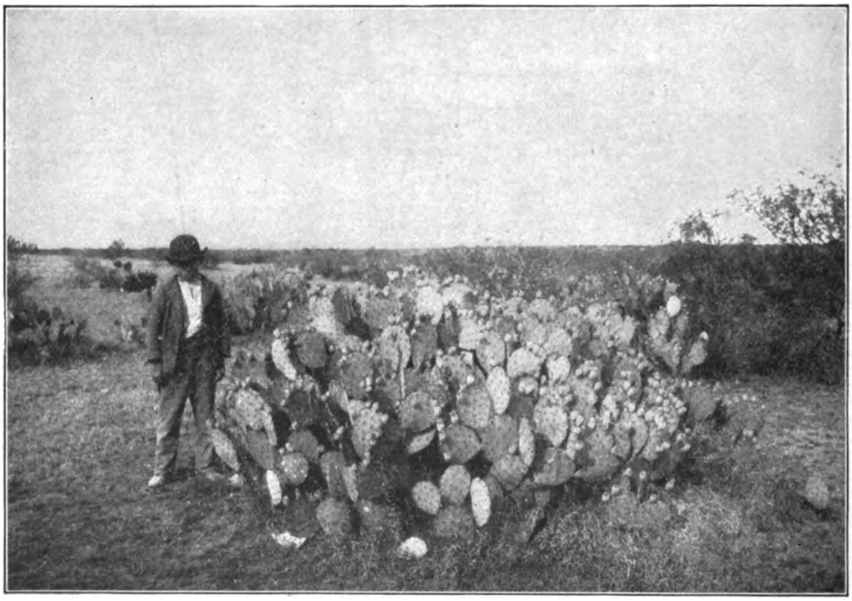
A series of illustrated papers on some of the principal geographic features of the United States: "The Big Horn Region of Wyoming," by N. H. Darton; "The Bad Lands," "The Yosemite," "The Great Plains," etc.

UTILIZING THE DESERT

A NEW method of making the desert useful, which may perhaps give value to millions of acres now worthless, has been suggested by Mr W. P. Spillman, Agrostologist of the Department of Agriculture.

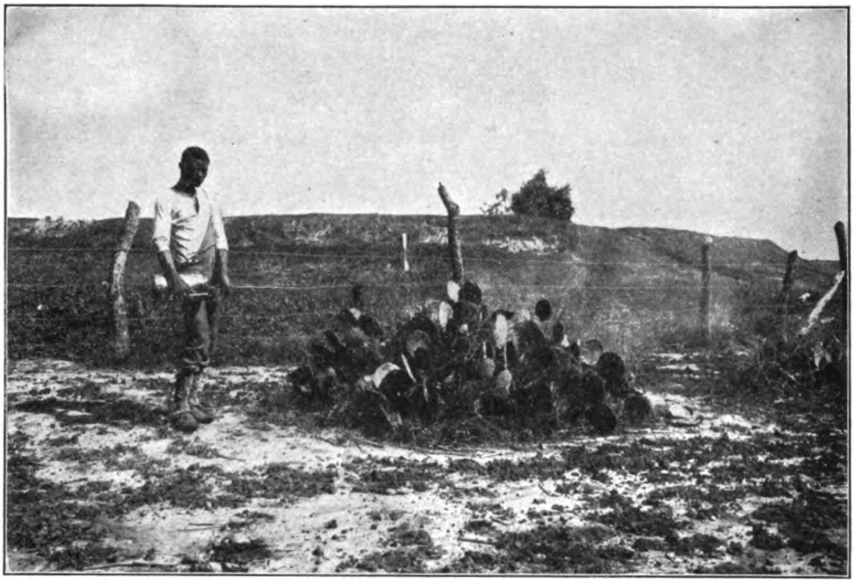
In certain parts of Texas ranchmen have been accustomed when forage has failed because of drought to cut down the prickly pear and feed it to cattle. They remove the thorns by singeing the plants in a fire or with a plumber's gasoline torch or cut the cacti to pieces with a machine. The cactus makes an excellent food, and in some sections of southern Texas the stock industry is almost entirely dependent on it during portions of the year. Cacti grow scatteringly in many parts of the dry region, but outside of southern Texas they are found only in limited areas in sufficient abundance to be used as forage. Now Mr Spillman suggests that varieties of cacti might be planted in those parts of the United States where they now grow scatteringly, and thus possibly utilize areas in Texas, Arizona, New Mexico, California, Kansas, Idaho, Montana, Colorado, Nevada, Utah, and even as far north as Nebraska, which are now of little value.

The Department of Agriculture has



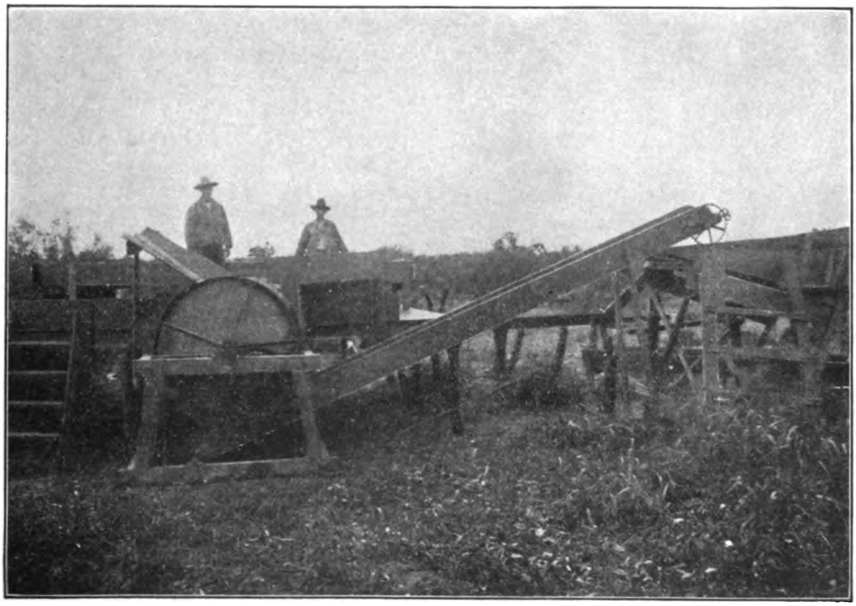
From David Griffiths, Department of Agriculture

One of the Common Prickly Pears of Texas in Full Fruit



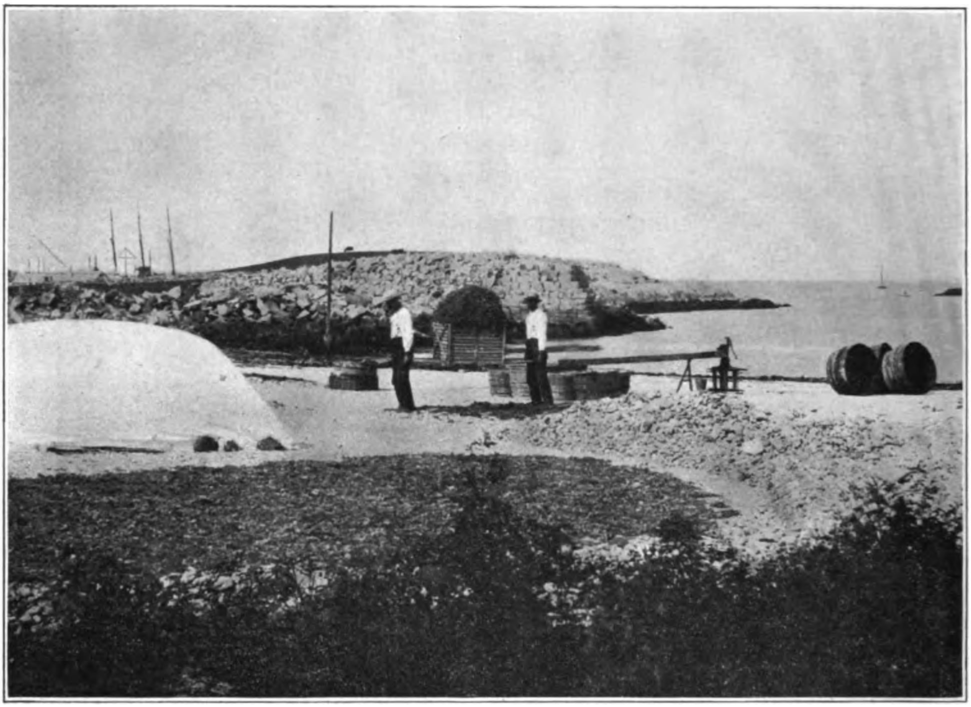
From David Griffiths, Department of Agriculture

Singeing the Prickly Pear of Texas with a Torch



From David Griffiths, Department of Agriculture

A Type of Pear Cutter, as Set Up and Operated



From Hugh M. Smith, Bureau of Fisheries

Gathering Irish Moss at Scituate, Massachusetts

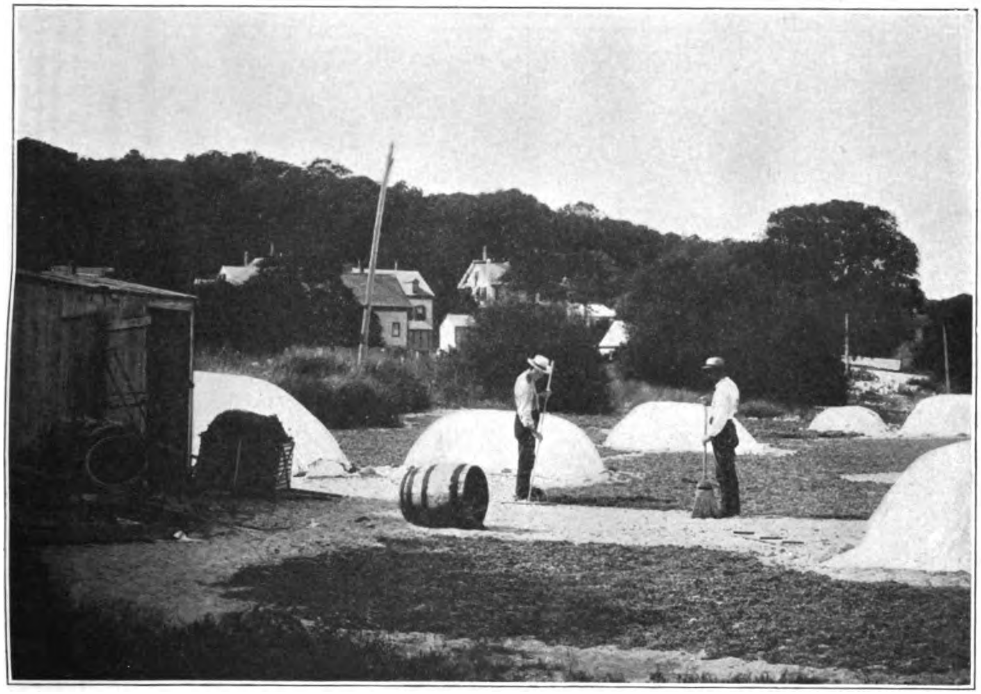
published a bulletin on "The Prickly Pear and Other Cacti as Food for Stock," by David Griffiths, which contains many interesting facts on this subject. It is believed by some that the natural cactus with its long thorns would be more serviceable than the thornless cactus of Mr Burbank, as it would not need to be protected against foraging cattle.

THE SEAWEEDS OF THE UNITED STATES

WITH seaweed resources certainly not inferior to those of Japan or any other country, and probably much superior, the United States may be said practically to ignore these valuable products except at a few points on its extensive coast. Statistics recently gathered give the paltry sum of $35,000 as the value of the marine algæ prepared in the United States in one year. The business is practically restricted to Massachusetts, and is addressed to a single species, the "Irish moss" (*Chondrus crispus*). Considerable quantities of seaweeds are used as fertilizer on farms adjacent to the coast, but this is not a commercial enterprise. In Monterey and Santa Barbara counties, California, the Chinese fishermen dry certain algæ for food, medicine, and fertilizer.

GEOLOGIC FOLIOS IN SCHOOLS

THE Germans have a study in some of their schools which they call "Heimathskunde"—the study of home. Pupils are instructed minutely in the knowledge of their immediate environ-

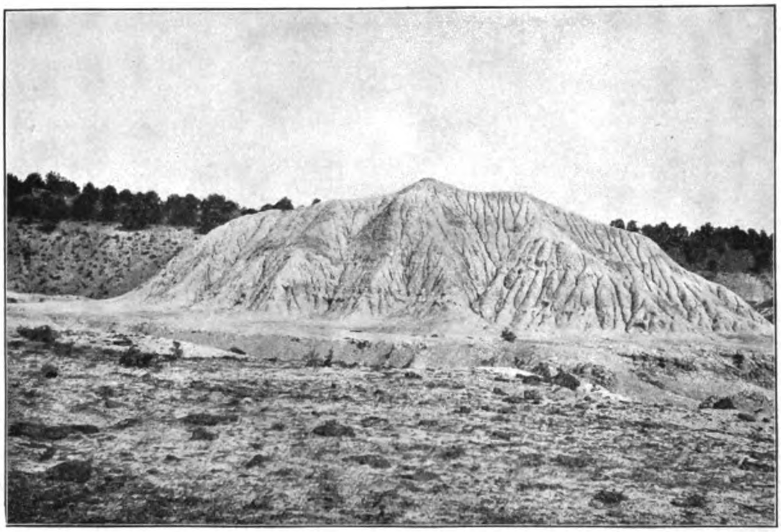


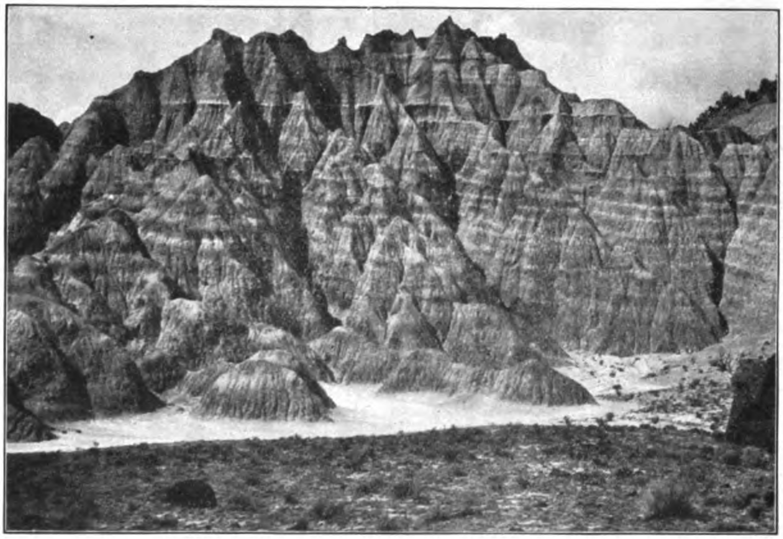
From Hugh M. Smith, Bureau of Fisheries

Bleaching and Curing Irish Moss at Scituate, Massachusetts

ment. They learn not merely the names and characteristics of the mountains that surround their native place and the streams that flow through it, but they study the special resources and industries of the locality, the city's streets, parks, museums, art galleries, water works, garbage plant, fire department, etc. It is a study that makes them more enlightened citizens.

Similar studies are prosecuted in many American schools, and the American teacher has at his command a valuable aid in studying many localities, of which, unfortunately, few avail themselves. This aid consists of the separate folios of the geologic atlas of the United States which the United States Geological Survey is engaged in publishing. Each folio includes a topographic map and geologic map of a small area of country, together with explanatory and descriptive texts. Frequently these folios also contain structure section sheets and columnar section sheets, maps illustrative of the artesian water supply of the area, diagrams of coal sections, or photographic reproductions of specially interesting topographic features or of peculiar fossil types. The Survey has issued 119 geologic folios up to date. That means that teachers may have at very little cost the most complete and scientific description yet published of 119 different areas in the United States, each illustrated by the latest topographic and geologic maps. As text-books in geography, geology, and mineralogy for the limited





From Israel C. Russell, U. S. Geological Survey

Excellent Examples of Weathering near Logan Butte, Cook County, Oregon

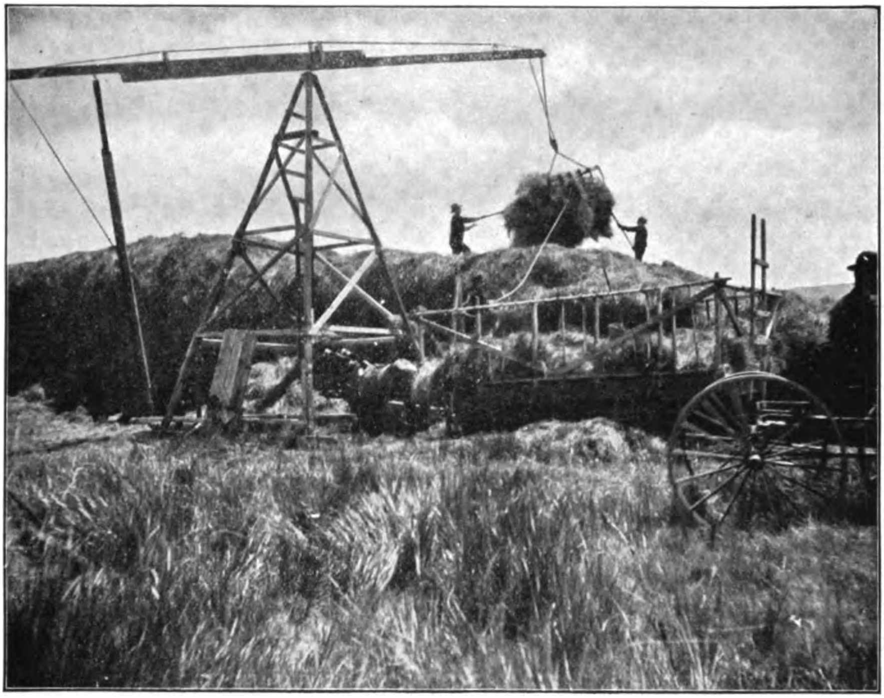
These peculiar-shaped mounds have been carved by the action of sun and rain from soft shales. Numerous well-preserved bones of extinct mammals have been found in these beds.

area each represents, they should be highly appreciated.

To encourage the purchase of these folios for educational purposes, the Geological Survey has lately reduced the wholesale price on folios. When purchased separately, the folios of ordinary size cost 25 cents each, those of greater length cost 50 cents each, and a few of extraordinary size cost 75 cents each. The Survey now offers 34 folios of the ordinary size for $5.10, which makes the price of each copy only 15 cents. A corresponding reduction of 40 per cent is made on the wholesale price of the large folios.

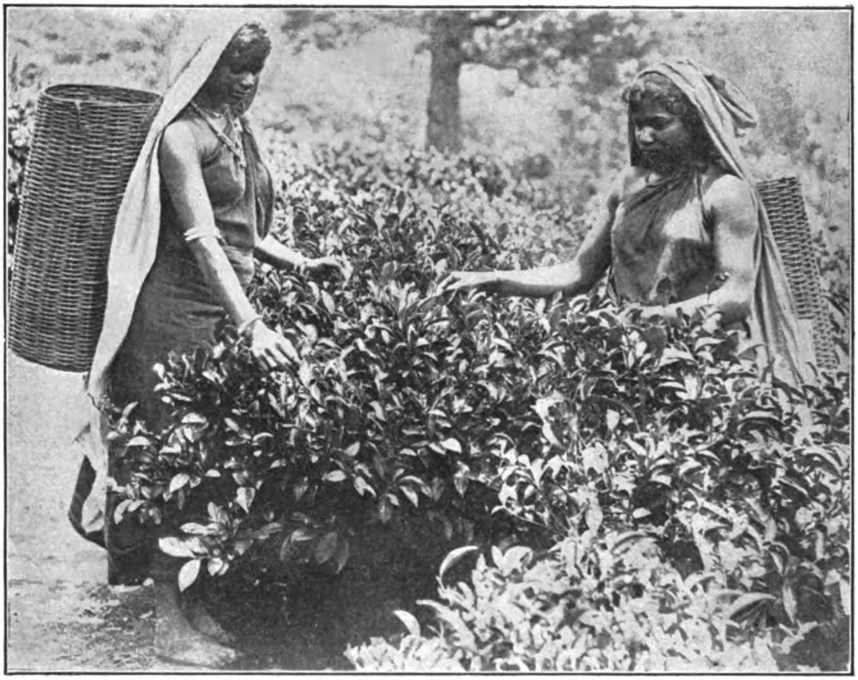
To show how reasonable is the price of these folios, when regarded as textbooks, consider the New York city folio. The retail price is 50 cents a copy. It contains 17 pages of text, 13 pages of maps (each one of which would cost 5 cents if purchased separately), and 2 pages of plates. Other cities covered by geologic folios are Washington and Chicago. One folio (No. 50, Holyoke) has been issued for the New England area. The price of each of these is 50 cents.

Those desiring information as to the areas now covered by the folios should apply to the Director of the United States Geological Survey, Washington, D. C.

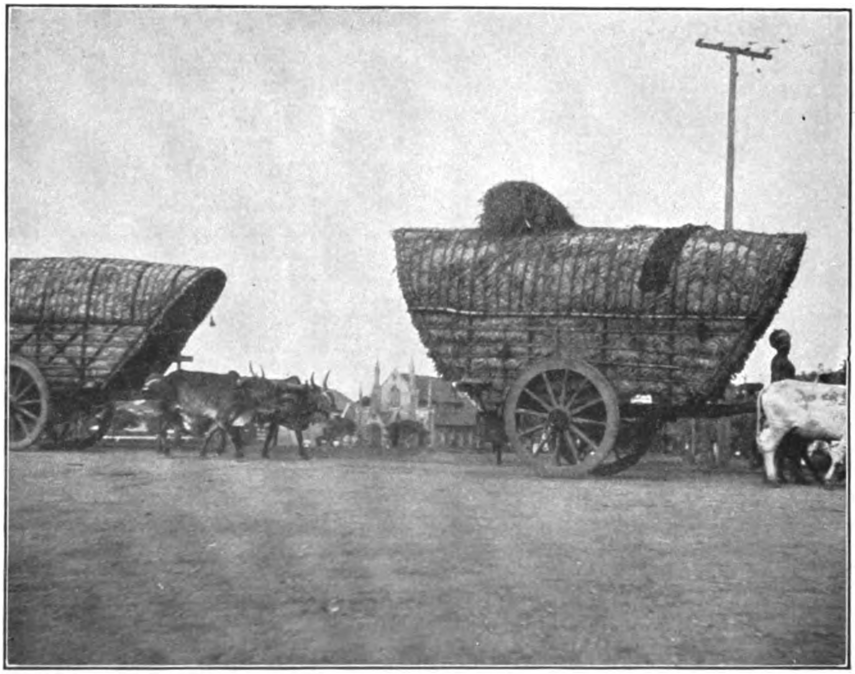


Stacking Alfalfa with a Derrick on a Western Farm

From an interesting report on our great forage crops by A. S. Hitchcock, of the Department of Agriculture.



Tamil Girls Picking Tea, Ceylon



From S. A. Knapp Department of Agriculture

Carts with Bamboo Covers, Ceylon

NOTE ON THE ACTIVITY OF SHISHALDIN VOLCANO

IN March, 1903, the NATIONAL GEOGRAPHIC MAGAZINE published some striking photographs of the mountains on Unimak Island, Alaska, and gave a vivid account of the nature of Shishaldin's activity.

It will not be without interest to add some personal observations of a later date. On September 14, 1904, while in command of the Coast and Geodetic Survey steamer *McArthur* and while passing Shishaldin at a distance of from 15 to 18 miles, I made the following observations on the volcano, which was visible for several hours during the afternoon:

The volcano was seen to be in a mild state of activity. In addition to a continuous emission of dense white smoke or steam, circular rings apparently several hundred feet in diameter and of remarkable symmetry and whiteness were seen to emerge in puffs at short intervals from the very top of the mountain.

Frequently two or three of these would remain visible at the same time.

HOMER P. RITTER,
U. S. Coast and Geodetic Survey.

COTTON CULTIVATION IN THE BRITISH EMPIRE

AN interesting geographic contribution is a British blue book of last year on cotton cultivation in the British Empire and Egypt, prepared by Prof. W. Dunstan, director of the Imperial Institute at South Kensington, with the aid of his scientific staff (folio, 40 pages, map, and diagrams). He discusses, in all that broad belt from 40 degrees north to 40 degrees south, the natural conditions and past efforts for developing the cotton industry in all the British possessions that seem at all fitted by nature for growing this plant, with a brief treatment of the characteristics of cotton. He makes the fullest acknowledgment to American works on the entire industry from the seed to the finished product, and pays high tribute to the knowledge and labor of our Department of Agriculture. In fact, he considers our "paramount" position due to the operation of this branch of the government. After this comprehensive survey of the matter, he finds no hope of displacing our leadership, but the most promising territory for competition with us is in Africa, with something additional in the East and West Indies. But to any one acquainted with our cotton area it is feared that Professor Dunstan is not a safe guide. In his "sketch map of the cotton belt of the world" he actually has cotton growing in the United States up to the latitude of New York and thence straight across beyond the Mississippi River—at least double the space on which it can be possibly produced. He also has cotton in China as far north as Peking. It is most likely that such blunders arose from employing a purely bookish man to do practical work. C. M.

WATER EROSION THEORY A FALLACY

With Apologies to Prof. H. L. Fairchild *

THE arguments against the possibility of erosion by running streams may be summed up as follows:

1. No one ever saw a stream eroding its bed or banks.

2. True, some streams are often muddy, which is interpreted by certain geologists as evidence of erosion, but the amount of detritus thus carried is trifling, if it is measured without prejudice.

3. Rivers deposit detritus in certain places; therefore they cannot erode.

4. In some places rivers flow over soft material without moving it; hence they never erode.

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* Ice Erosion Theory a Fallacy, by Prof. H. L. Fairchild. Bull. Geol. Soc. Am., vol. 16, pp. 13–74.

5. In many places no deposits from rivers are seen. If there are no deposits, there can have been no erosion. The amount of deposit discovered must equal the amount eroded, for none is carried to the sea or otherwise hidden.

6. The water in the middle of a stream moves faster than that near the bottom or sides; hence the upper layers move over the lower layers, and the latter thus become nearly stagnant, and lose whatever cutting power they might have possessed.

7. Water, being liquid, flows around and over obstacles instead of cutting them away. The existence of an island in a stream is conclusive proof of the stream's inability to erode. Being liquid, water cannot hold up its cutting tools to their work.

8. The fluency of water diminishes with the amount of sediment carried. Since a river has no means of getting rid of its load of detritus, this load accumulates near the mouth, where it must eventually become too great to allow erosion; hence stream erosion, if there be any, must be confined to the upper reaches of the streams, where the load of detritus is moderate.

9. True, flowing water does change the form of canyons carved by other agencies. Thus it changes the cross-section of a glacier-carved valley from a U shape to a V shape, but we will not call this erosion.

10. It is perfectly possible for streams to carry sharp-edged sand along their bottoms and sides without doing any erosion.

11. If one cannot prove absolutely that erosion is in any case caused by running water, therefore it must have been done by ice.

12. The majority of geologists and physiographers are in accord with these views. H. G.

Field Courses in Geology.—A joint announcement has been issued describing the field courses in geology which will be given during the summer of 1905 by Chicago, Columbia, Harvard, Johns Hopkins, Kansas, Minnesota, North Carolina, Ohio State, Leland Stanford Junior, and Wisconsin Universities. There is also an inter-collegiate Appalachian course of five weeks' duration, which will be given under the direction of several instructors, and will include the study of the tertiary and cretaceous formations of Maryland, the paleozoic strata of the Susquehanna-Juniata district of Pennsylvania and central New York, the crystalline and paleozoic rocks of the Little Falls district of eastern New York, and the metamorphic and triassic rocks of western Connecticut. The courses offered by the several universities cover a wide range of territory, extending from Vancouver Island and California, on the Pacific coast, to North Carolina, Maryland, and New York, on the Atlantic, while one course is announced for Iceland, where four weeks will be spent in the study of volcanoes, glaciers, and geysers. Each of these courses will be under the guidance of a geologist familiar with the geology of the region studied. In the list of instructors appear the names of the following well-known geologists:

J. C. Branner, Wm. B. Clark, H. P. Cushing, Wm. M. Davis, A. W. Grabau, C. W. Hall, E. Haworth, W. H. Hobbs, Charles S. Prosser, R. D. Salisbury, N. S. Shaler, Stuart Weller, J. B. Woodworth, T. C. Hopkins, S. Barrell, R. T. Chamberlin, W. W. Atwood, T. A. Jaggar, Collier Cobb, and J. F. Newsom.

THE ECONOMIC IMPORTANCE OF THE PLATEAUX IN TROPIC AMERICA

BY J. RUSSELL SMITH, PH. D.

Tropic America presents the unusual spectacle of a region in which one type of district supports most of the population and another supports the more important foreign trade.

In temperate North America and in Europe the centers of population and production are upon the lowlands. In tropic America the centers of population are upon the highlands, while the lowlands are the natural place for the production of the most desired products of that zone. Accordingly, the majority of the people live upon the poorest land, in positions very difficult of access to commerce, and the fertile and accessible regions are unsettled, while the civilized world experiences a growing demand for the really tropical products, which they now produce in an unsystematic way.

The tropic highlands, in one-half or more of their exports, are competing with temperate-zone lands. The lowlands are the real tropics of commerce. The economic question is, Can they become populated and developed?

Two methods are now available—the importation of the Asiatic coolie and the application of science to make these lands habitable by Caucasians. The first method is being successfully tried in some countries and the second is full of possibilities. Science is just beginning to be applied to the problems of eliminating disease, improving tropic agriculture, and overcoming the difficulties of environment. The present century may witness the opening up of practically a new world to population and commerce through the settling of this now neglected part of the world by people who will at least be socially and industrially organized by the most advanced races.

THE EXPLORATION OF ALASKA

BY ALFRED H. BROOKS, CHIEF OF ALASKAN DIVISION, U. S. GEOLOGICAL SURVEY

The first knowledge of Alaska was obtained by the Russians, who in the early part of the eighteenth century had established themselves on the western shore of Bering Sea and first learned of the continent beyond the sea from the natives, for it was not until 1841 that they obtained any definite knowledge of Northwestern America by personal observation. It was then that Bering made his fateful voyage and definitely established at least one point on the mainland of Alaska. Subsequently exploration appears to have taken place from three directions. The Russians came from the west, across Siberia, Bering Sea and Straits; the English from the east, by way of McKenzie Valley, and navigators of various nationalities explored its coast, approaching from the south by following the eastern shore of the Pacific. Among the important expeditions were those led by Bering, Lütke, Kotzebue, Cook, Vancouver, Franklin, Beechey, Malaspina, La Pérouse, and several Spaniards. By the middle of the eighteenth century the coast-line of Alaska was fairly well known, but the detailed charting has not even yet been completed, though the United States Coast Survey has been actively at work for many years. Of the interior of Alaska the Russians knew comparatively little, though they explored the lower stretches of the Yukon, the Kuskokwim, and Stikine. The Upper Yukon was reached by the Hudson Bay traders in the middle of the nineteenth century.

In 1865 the exploration of Alaska was much accelerated by the work of the corps of explorers organized by the Western Union Telegraph Company, of whom William H. Dall and Robert Kennicott were the most prominent.

When Alaska came into the possession of the United States, but little attempt was made to explore its interior, though a few expeditions were sent out under various auspices. Thus it was that Schwatka made an exploration of the Lewes and Yukon rivers, though these were already pretty well known, thanks to the traders and prospectors. Allen traversed the Copper, Tanana, and Lower Koyukuk rivers, while Stoney took up the exploration of the Kotzebue Sound region, and in the same district Cantwell and McLannigan made important explorations.

Though public enterprise amounted to little, yet the ever-ready American frontiersman and prospector penetrated this wilderness and did much in making it known to the world. Among the most prominent were Frank Densmore, Arthur Harper, Jack McQuestin, and Jack Dalton.

In 1891 the Coast Survey was represented in the interior in Alaska by parties which located the international boundary and made an exploration through to the Arctic coast from the Yukon drainage basin. During the same period Schwatka and Hayes made a journey of exploration from the Yukon to the Copper by way of the head of the White.

It was, however, not until the discovery of the famous Klondike gold fields that Congress awoke to the necessity of systematic explorations and surveys of this great area. Appropriations for this purpose were made in 1898, which have been continued up to the present time. Much of the interior of Alaska has been explored by the many parties of the United States Geological Survey. These have covered an area which can be approximated at 100,000 square miles, and now practically every large river in the territory except the Noatak, Colville, and Alsek has been surveyed. All of the mountain ranges except those of the extreme northern part of the territory have been outlined by exploratory surveys, and much of the great interior basin has been mapped with a sufficient degree of accuracy for present purposes.

Of unknown regions there are in Alaska only three of considerable extent. The smallest of these embraces the great snow-covered

Saint Elias range, which, though but a short distance from tide-water, is so inaccessible that little is known of its geography or geology. A second unexplored area lies adjacent to the Arctic coast and the international boundary, and extends southward down into the Yukon Basin, and embraces about 40,000 square miles that are practically unknown.

A third unexplored area lies in the northwestern part of the territory west of the 151st meridian and north of the 68th parallel. This also includes about 40,000 square miles and is almost entirely unknown, though Schrader and Howard have traversed its eastern margin. Of little-known areas we have also the Kuskokwim Basin, which probably embraces some 15,000 square miles, less than half of which have been surveyed.

GEOGRAPHIC LITERATURE

Anemia in Porto Rico. By Bailey K. Ashford. Bureau of Printing, San Juan, Porto Rico. 1905.

Another convincing instance of the great work being done by our government to help the people in our semitropical possessions is given in the recently published report of the commission appointed to report on the possibility of suppressing "anemia" in Porto Rico. Anemia has always been more or less active in Porto Rico, but after the hurricane of 1899 it became specially troublesome. People thought that it was the result of poor food, worry, destitution, etc., but Dr Bailey K. Ashford, U. S. Army, identified it as the same disease as tropical anemia, prevalent in Mexico and elsewhere, and caused by a parasitic worm in the intestines.

Through the coöperation of Governor Hunt the Porto Rican legislature in the winter of 1904 was induced to appropriate $5,000 for the study and treatment of the disease. Governor Hunt appointed as members of the commission Captain Ashford, Surgeon W. W. King, and Dr Igaravidez. These gentlemen made a tour of the island, examining and treating 500 to 600 persons a day. The patients would begin to arrive early in the morning, in many cases having traveled since the day before, generally on foot; sometimes they spent several days on the road. Very bad cases were carried in hammocks to the camp. In practically every case the disease was found to be caused solely by "uncinaria." Patients were given a prescription which they presented to the apothecary, who delivered the medicine with directions as to how it should be taken, the patients, or those accompanying them, being required to repeat these instructions until they were thoroughly understood. They were directed to return in one week for reëxamination and more medicine, most of them doing so with considerable regularity. The more advanced cases were treated in hospitals hastily constructed of tents.

In his report on the work of the commission Captain Ashford states that probably 90 per cent of the rural population of Porto Rico suffer from anemia. Such a large percentage of affected must injure the economical power of the country. The parasitic worm usually gains entrance by the penetration of the larvæ through the skin. The disease is curable in the great majority of cases and can, believes Captain Ashford, be practically stamped out of the island if hygienic laws are enforced. The limited sum at the disposal of the commission enabled them to carry on their work for a few months only. The members received no salary, and each member provided his own instruments and laboratory equipment.

Sweden: Its People and Its Industry. Edited by Gustav Sundbärg. Pp. xi + 1143. Illustrated. Stockholm. 1904.

This is the third edition, the first

being in French and the second in Swedish, of a most comprehensive and valuable hand-book of Sweden, historical and statistical. It comprises about one hundred and fifty separate memoirs, written by a hundred or more of the leading Swedish scientists and officials, covering almost every phase of industrial, social, commercial, or agricultural activities. The principal subdivisions are physical geography, the Swedish people, constitution and administration, education and culture, agriculture, forestry, fishing, mining, manufactures, commerce, navigation, internal communications, credit and insurance, industrial and labor legislation, and social statistics.

The volume is provided with excellent maps, well chosen and attractive illustrations. The translation is good, the typography of a high order, and an index enhances the value of the volume for standard reference. The publication is most creditable to the Swedish government and to its editor, G. Sundbärg, who has compiled valuable and comprehensive statistics, extending in some instances to the end of 1903. A. W. G.

The Moon. By William H. Pickering. Pp. viii+103. 12⅝ x 10⅝ inches. New York: Doubleday, Page & Co. 1903. $10.00 net.

With the aim of summarizing some of the more recent lunar knowledge chiefly acquired in the Harvard observatories located in low latitudes, Prof. Pickering has given us one of the most entertaining volumes in existence on this subject for the general reader. It has been found that the clearest atmosphere can be obtained only in the trade-wind belt, which is so largely free from the terrible storms raging in the temperate zones. Hence chief progress has been made in the two stations of this foremost American university. Prof. Pickering treats of the origin of the moon, its motion, its physiography, with a very readable sketch of the history of lunar research. There are a number of beautiful illustrations based largely on the photographs taken by the author and his assistants. The whole volume is in the fine typographical dress usual with this firm of publishers.

C. M.

Early Western Travels, 1748–1845. Edited by Reuben G. Thwaites. Vol. VII, Buttrick's Voyages, 1812–1819; Evans' Pedestrious Tours, 1818. Pp. 364. Vol. x, Hulme's Journal, 1818; Flower's Letters from Lexington and the Illinois, 1819; Flower's Letters from the Illinois, 1820–1821; Wood's Two Years' Residence, 1820, 1821. Pp 357. Cleveland: Arthur H. Clark Co. 1904. $4.00 *net.*

Buttrick's experiences give glimpses of life in Kentucky and along the Natchez trail, while Evans describes conditions in Michigan and along the great rivers from Pittsburg to New Orleans.

Volume x covers the English settlement made under Morris Birkbeck and George Flower in Illinois near Cairo, which led to violent discussions in which William Cobbet was prominent. Wood presents in clear and definite form the thoroughly novel conditions of agriculture and trade of frontier life and the social problems which confronted the English colonists.

Both volumes are specially interesting as illustrating the conditions of life west of the Alleghanies after the war of 1812, when tens of thousands removed from the Atlantic states to these fertile regions. In general the annotations of the editor are pertinent and judicious. A.W. G.

The Future of Road-making in America (Historic Highways of America, vol. 15). By Archer Butler Hulbert. Pp. 211. 7⅝ x 5 inches. Cleveland: The Arthur H. Clark Co. 1905.

With the aid of Messrs Dodge, Elridge, Page, of the United States government service in Washington, and Mr Harrison, of New Jersey, Mr Hulbert gives us a symposium on the vast problem of good roads. He contributes the first paper, which forms the title of the volume, composed largely of extracts from the words of other men summing up the blessings of improved highways. His co-laborers treat of government aid, the advantages to farmers, the proper material for constructing the bed, and the methods followed in New Jersey. The volume is thus a happy combination of the ideal and the practical, all told in readable style, with the aim of popularizing the subject. Hence technical details are pleasantly passed over, though enough of the realistic side is presented to assist a man of fair common sense to undertake some improvement himself, since the views of experts are rather liberally borrowed. One of the most striking utterances on this transportation question is that of President Winston, of the North Carolina Agricultural College. He declares that bad roads are unfavorable to matrimony and increase of population. In this day of interest in the Racial Suicide theory this position should arouse the greatest attention. C. M.

The Great American Canals, vols. I, II. By Archer B. Hulbert. Cleveland: The Arthur H. Clark Co. 1904.

I. The Chesapeake and Ohio Canal: The Pennsylvania Canal. Pp. 231. Illustrated.

II. The Erie Canal. Pp. 234. Illustrated.

These volumes, 13 and 14 of Historic Highways, supplement the series of memoirs on the public roads of the United States by accounts of the great waterways. The Chesapeake and Ohio Canal was a continuance of the effort of the Potomac Company fostered and directed in its earlier years by George Washington to provide adequate transportation facilities to the trans-Alleghany region. Through an appropriation by Congress the route for a canal from Washington to Pittsburg was surveyed, but construction was never completed further than Cumbe Island, Md. This point was reached in 1850 after twenty-six years' work and at a cost of more than eleven millions. The rivalry between the canal and the Baltimore and Ohio Railway, as well as the mixture of politics and business which practically doubled the cost, affords interesting reading.

More important was the Pennsylvania Canal, which by a system of railways and waterways 394 miles in length, united Philadelphia and Pittsburg. It consisted of a railway to Columbia, on the Susquehanna, whence canal-boats ran through to Pittsburg, crossing the Alleghanies by a portage road from Hollidaysburg to Johnstown, on the Allegheny. This system, although twice the length, cost one million dollars less than the Chesapeake and Ohio Canal.

The two canals here described may be said to represent the rivalries of the ports of Baltimore and Philadelphia.

The Erie Canal, while representing the commercial interests of New York, proved to be more permanent and far broader in its utilities. It affected the trade of the entire region of the Great Lakes and of the upper Mississippi, and this marked an important epoch in the commercial history of the United States. It is to be regretted that the space given to local politics was not used for an analysis of its economic influences.

A. W. G.

Historic Highways: Pioneer Roads, vol. I. By Archer B. Hulbert. Pp. 200. Illustrated, Cleveland: The Arthur H. Clark Co. 1904.

This volume is rather heterogeneous in its material, which covers the evolution of turnpikes from trails and brief experiences in frontier travels. The volume scarcely equals in interest others of the series. A. W. G.

WE have published a new edition of our map of Alaska, which was prepared by the United States Geological Survey. The map is 36 by 42 inches, in 3 colors, and is the first contour map of Alaska that has been made. : : : : By mail, 25 cents.

National Geographic Society

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VOL. XVI, NO. 6 WASHINGTON JUNE, 1905

THE NATIONAL GEOGRAPHIC MAGAZINE

FORECASTING THE WEATHER AND STORMS*

BY PROFESSOR WILLIS L. MOORE, LL. D.,

CHIEF UNITED STATES WEATHER BUREAU AND PRESIDENT NATIONAL GEOGRAPHIC SOCIETY

THE author would urge all intelligent persons to abandon the idea that the weather map is an enigma too difficult for them to solve. To one who will read this chapter once or twice, and carefully follow the charts as they at successive steps illustrate and make clear the text, the daily weather chart will be an object of interest as well as pleasure and profit. Sometimes the problems presented by the map are so simple that one possessed of the most elementary knowledge of its construction can accurately forecast the character of the coming weather; and again, the most expert forecaster is unable to clearly foresee the impending changes.

Weather maps differ as much as do the members of the human family; no two are precisely alike, although they may be similar in their fundamental characteristics. Some are so radically dissimilar to others that it requires but a glance to learn that similar weather cannot follow both. Weather forecasting may be fairly placed upon a plane with the theory and practice of medicine. The forecaster is in a degree guided in his calculations by symptoms, and he is able to diagnose the atmospheric conditions with about the same degree of accuracy that the skilled physician is able to determine the bodily condition of his patient. He is able to forecast changes in the weather with rather more certainty than the physician can predict the course and the result of a well-defined disease. While but less than a century ago we knew not whence the winds came nor whither they went, we are now able, through the aid of daily meteorological observations and the telegraph that joins our places of observation by an electric touch, to trace out the harmonious operations of many physical laws that previously were unknown, and that determine the goings and the comings of the winds, and the sequence in which weather changes

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occur; but in weather forecasting it will never be possible to attain the accuracy acquired by astronomers in predicting the date of an eclipse or the occurrence of celestial events.

In this connection it is interesting to note that at the time of the founding of the first of the Thirteen Colonies, at Jamestown, Virginia, in 1607, practically nothing was known of the properties of the air or of the methods of measuring its phenomena. Today, at over 200 stations in the United States, Canada, and the West Indies, electrically recording automatic instruments measure and transcribe, for each moment of time, the temperature, the air pressure, the velocity and the direction of the wind, the beginning and the ending of rainfall, the amount of precipitation, and the duration of sunshine.

It was not until 1643, twenty-three years after the landing of the Pilgrims at Plymouth Rock, that Torricelli discovered the principle of the barometer, and made it possible to measure the weight of the superincumbent air at any spot where the wonderful, yet simple, little instrument might be placed. His great teacher, Galileo, who was so cruelly persecuted for teaching the truth of the Copernican theory and for the invention of the telescope, died without knowing of the barometer. He therefore never understood why "nature abhors a vacuum." But meteorologists as well as astronomers must ever pay homage to his great intellect, for, among many other valuable inventions, he discovered the principle of the thermometer. The data from the readings of the barometer and the thermometer form the foundation of meteorological science. Their inventors as little appreciated the value of their discoveries as they dreamed of the great empire then just rising from the mists of the western seas, which should come into existence and first use their instruments to detect the inception of storms.

THE RESEARCHES OF BENJAMIN FRANKLIN

About one hundred years after the invention of the barometer Benjamin Franklin, statesman, diplomat, patriot, and scientist, divined that northeast storms were caused by atmospheric disturbances located to the southwest of the regions experiencing the northeast winds. He compared the movement of the air to water held in a canal by a gate at the lower end. When the gate is opened the water nearest it moves first, then that next higher up, and so on, until motion is imparted to the water at the far end of the canal. His simile does not explain what actually occurs, but it closely approaches the truth. It was prophetic that this idea should come to him long before any one had ever seen charts that show weather observations simultaneously taken at a system of stations scattered throughout a broad area. His theory was equally as important as his act of drawing the lightning from the clouds and identifying it with the electricity of the laboratory, but his contemporaries thought little of it and it was soon forgotten.

It will aid in understanding the cyclonic motion of storms, which will be fully explained a little farther along in this chapter, to learn how Franklin came to reach his conclusions as to the cause of the northeast winds. He had arranged with his brother in Boston to take observations of a lunar eclipse at the same time that he himself would take them in Philadelphia. Early on the evening of the eclipse an unusually severe northeast storm began at the latter place, lasted many hours, and prevented Franklin from getting observations. As the wind blew fiercely from the northeast, he reasoned that of course the storm came from that direction, and that his brother's views in Boston also were obscured. What was his surprise, a few days later, to receive word that the night was clear and that good observations were secured, but that a severe northeaster began the next morning. He then sent out many inquiries to stage stations, and learned that at all places southwest of Philadelphia the storm began earlier, and that the greater the distance the earlier the beginning, as compared with its advent in Philadelphia. Northeast of Philadelphia the time of beginning was later than at that city, the storm not reaching Boston until twelve hours after its commencement at Philadelphia.

Franklin's analogy of the water is all right so far as it goes. But if, instead of the canal, he had imagined a broad ocean, and in place of the gate he had located a maelstrom a hundred miles wide in the center of the ocean, toward which the waters within a circle a thousand miles in diameter were moving, first slowly and directly toward the center, then with accelerating velocity and increasing deflection to the right of the center, and finally faster and faster as they drew near and gyrated with fearful speed about the orifice down which they must plunge, he would have gained a clearer idea of the motions of the air in a large cyclonic storm, except that to make the analogy perfect it is necessary to invert the maelstrom and have the upper surface of the ocean face downward upon the land to represent the atmosphere, and then the maelstrom, with its vast system of in-flowing currents, must have a movement of translation eastward.

The northeast hurricane that swept the region from Boston to Philadelphia was caused by the suction exercised by a cyclonic storm advancing from the southwest, which drew the air rapidly from Boston toward Philadelphia, while the source of the attraction—the center of the cyclone—was several hundred miles to the southwest of the latter place. The velocity of the northeast winds increased as the center of the cyclone came nearer and nearer, until the winds reached the force of a hurricane. When the center of the storm reached the vicinity of Philadelphia the winds suddenly became variable and light, and as the center of the disturbance passed the winds arose as quickly as they had subsided, but with this difference : they now blew from some westerly point indirectly, or spirally toward the center of the storm that was passing eastward, and diminished in force as the center gained distance.

Had the telegraph been in existence in Thomas Jefferson's day he doubtless would have conceived the idea of forecasting the weather. In conjunction with his friend, James Madison (afterward Bishop), he conducted a series of weather observations, which were begun in 1771 and continued during the stirring times of the Revolution. Madison was near the sea, at Williamsburg, the colonial capital of Virginia ; Jefferson was at Monticello, 120 miles west. They took simultaneous observations for several years, until the British ransacked Madison's house and carried off his barometer. By comparing observations they discovered that barometric and thermometric changes occurred at Monticello three or four hours before they did at Williamsburg.

THE BEGINNING OE THE AMERICAN WEATHER SERVICE

Although American scientists were the pioneers in discovering the progressive character of storms and in determining the practicability of forecasting the weather, the United States was the fourth country to give legal autonomy to a weather service. But it would require an international service, embracing all the countries of Europe, to equal the service of the United States in extent of the area covered. Furthermore, forecasts for the countries of western Europe can never cover the time in advance or attain the accuracy of those made for the region east of the Rocky Mountains on the American continent, because of the ocean that lies to the west of these countries in Europe, from which observations cannot be secured. To be sure, wireless telegraphy may partly relieve the situation, but irregular observations from moving vessels cannot take the place of stable land stations.

At the time of the beginning of the U. S. weather service, in 1870, and for some years thereafter the forecasts and storm warnings were looked upon by the press and the people more as experiments than as serious statements. The newspapers were prone to comment facetiously on them, and many were clamorous for the abolition of the service. We knew nearly as much about the theory of storms then as we do today; but we had never had the opportunity to train a corps of expert forecasters, such as now form a considerable part of the staff of the Chief of the Weather Bureau, and from which he himself was graduated. This could only be done by several years of daily watching the inception, the development, and the progression of storms. After a time mariners began to note that in the great majority of cases storm warnings were followed by dangerous winds and to take heed accordingly. With experience the warnings became still more accurate, until now no port, however small, is without its storm-warning tower, and no mariner sails the seas who does not consult the signals, and no shipper of perishable commodities runs his business a day in the winter without being in touch with the source of cold-wave warnings, and no large grower of fruits or vegetables is content to be excluded from the receipt of the frost forecasts.

Redfield, Espy, Henry, Loomis, Maury, Abbe, and Lapham are the Americans to whom the world owes most for the founding of meteorological science and for the demonstration of the feasibility of weather forecasts.

HOW THE DAILY WEATHER CHART IS MADE

It is essential to a comprehension of the problems involved in the making of forecasts that one gain a knowledge of the methods of gathering meteorological observations and making weather reports. This morning at 8 o'clock—75th meridian time—which, by the way, is about 7 o'clock at Chicago, 6 o'clock at Denver, and 5 o'clock at San Francisco—the observers at about 200 stations scattered throughout the United States and the West Indies were taking their observations, and, with the aid of carefully tested instruments, noting the pressure of the air, the temperature, the humidity, the rainfall or snowfall, and the cloudiness at the bottom of the aerial ocean in which we live, and which, by its variations of heat and cold, sunshine, clouds and tempest, affect not only the health and happiness of man, but his commercial and industrial welfare. By 8.15 the observations have been reduced to cipher for purposes of brevity, and each has been filed at the local telegraph office. During the next 30 to 40 minutes these observations, with the right of way over all lines, are speeding to their destinations, each station contributing its own observations and receiving in return, by an ingenious system of telegraph circuits, such observations from other stations as it may require. The observations from all stations are received at such centers as Washington, Chicago, New York, and other large cities, and nearly all cities having a Weather Bureau station receives a sufficient number of reports from other cities to justify the issuing of a daily weather map.

Before examining the accompanying charts it may be well to glance at the central office in Washington, while the observations are coming in, so as to get an idea of how the charts are made for the study of the forecast official. From these he gets a panoramic view, not only of the exact conditions of the air over the whole country at the moment of taking the observations one hour before, but of the changes that have occurred in those conditions during the preceding 12 and 24 hours. As fast as the reports come from the wires they are passed to the Forecast Division, where a reader stands in the middle of the room and translates the cipher into figures and words of intelligible sequence. A force of clerks is engaged in making graphic representations of the geographical distribution of the different meteorological elements. On blank charts of the United States each clerk copies from the translator that part of each station's report needed in the construction of his particular chart. One clerk constructs a chart showing the change in temperature during the preceding 24 hours. Broad red lines separate the colder from the warmer regions, and narrow red lines inclose areas showing changes in temperature of more than 10 degrees. The narrow lines generally run in oval or circular form, indicating (as will be shown subsequently) that atmospheric disturbances move and operate in the form of great progressive eddies; that there are central points of intensity from which the force of the disturbance diminishes in all directions.

A second clerk constructs a chart showing the change that has occurred in the barometer during the past 24 hours. As in the construction of the temperature chart, broad, heavy lines of red separate the regions of rising barometer from those of falling barometer. Narrow lines inclose the areas over which the change in barometer has been greater than one-tenth, and so on.

Here, for instance, throughout a great expanse of territory, all the barometers are rising—that is to say, the air cools, contracts, becomes denser, and presses with greater force upon the surface of the mercury in the cisterns of the instruments, thereby sustaining the columns of liquid metal at a greater height in the vacuum tubes. Over another considerable area the barometers are falling, as increasing temperature rarefies and expands the volume of the air, causing it to press upon the instruments with less force. This chart is extremely useful to the forecaster, since, in connection with the general weather chart, it indicates whether or not the storm centers are increasing or decreasing in intensity, and, what is of more importance, it gives in a great measure the first warning of the formation of storms.

A third clerk constructs two charts, one showing the humidity of the air and the other the cloud areas, with the kind, amount, and direction of the clouds at each station. It is often interesting to observe at a station on the cloud chart high cirrus clouds composed of minute ice spiculæ moving from one direction, lower cumulo-stratus composed of condensed water vapor moving from another direction, and the wind at the surface of the earth blowing from a third point of the compass. Such erratic movements of the air strata are only observed shortly before or during rain or wind storms.

A fourth clerk constructs a chart called the general weather chart, showing for each station the air temperature and pressure, the velocity and direction of the wind, the rain or snow fall since the last report, and the amount of cloudiness. The readings of the barometer on this chart are reduced to sea-level, so that the variations in pressure due to local altitudes may not mask and obscure those due to storm formation. Then lines, called isobars, are drawn through places having the same pressure. By drawing isobars for each difference in pressure of one-tenth of an inch the high and the low pressure areas are soon inclosed in their proper circles. The word "high" is written at the center of the region of greatest air pressure and the word "low" at the center of the area of least pressure. Under the influence of gravity the air presses downward and outward in all directions, thus causing it to flow from a region of great pressure toward one of less. The velocity with which the wind moves from the high toward the low will depend largely on the difference in air pressure. To better illustrate: If the barometer read 29.5 at Chicago, Ill., and 30.5 at Bismarck, North Dakota, the difference of one inch in pressure would cause the air to move from Bismarck toward Chicago so rapidly that after allowing for the resistance of the ground there would remain a wind at the surface of the earth of about 50 miles per hour, and Lake Michigan would experience a severe "northwester."

CYCLONIC STORMS

Chart No. 1 shows a winter storm (cyclone) central in Iowa at 8 a. m., December 15, 1893. The word "low" marks the storm center. It is the one place in all the United States where the barometer reading is the lowest. The heavy, black lines, oval and nearly concentric about the low, show the gradation of air pressure as it increases quite uniformly in all directions from the storm center outward.

The arrows fly with the wind, and, as will be seen, are almost without exception moving indirectly toward the low or storm center, clearly demonstrating the effect of gravity in causing the air to flow from the several regions marked high, where the air is abnormally heavy, toward the low, where the air is lighter. As the velocity of water flowing down an inclined plane depends both on the slope of the plane and on the roughness of its surface, so the velocity of the wind as it blows along the surface of the earth toward the storm center depends on the amount of the depression of the barometer at the center and the resistance offered by surfaces of varying degrees of roughness. The small figures placed at the ends of the arrows indicate wind velocities of six miles per hour and more. At Chicago, where the wind is blowing at the rate of 40 miles per hour, the anemometer is 270 feet high, while at Minneapolis, where the instrument is so low as to be in the stratum whose velocity is restricted by the resistance encountered in flowing over forests to the northward, the rate is not great enough to be marked by a figure. At Chicago and Davenport the wind is blowing against the pressure gradient, away from the low. This is due to the fact that it has flowed swiftly from the south and gained such momentum that it rushes by the storm center before the gradient on the north of the center can overcome its movement and turn it.

Now picture in your mind the fact that all the air inside the isobar (heavy black line) marked 30.2 as it moves spirally inward is rotating about the low in a direction contrary to the movement of the hands of a watch, and you have a very fair conception of an immense atmospheric eddy, or cyclone.

Have you ever watched the placid water of a deep running brook and observed that where it encountered a projecting crag little eddies formed and went spinning down the stream? Well, storms are simply great eddies in the air that are carried along by the general easterly movement of the atmosphere in the middle latitudes of both hemispheres and by the westerly movement of the general circulation in the tropics. But they are not deep eddies, as was once supposed. The low marks the center of an atmospheric eddy of vast horizontal extent as compared with its thickness or extension in a vertical direction; thus a storm condition extends from Washington to Denver in a horizontal direction, and yet extends upward but four or five miles. The whole disk of whirling air four or five miles thick and 1,500 miles in diameter is called a cyclone or cyclonic system. It is important that a proper conception of this fundamental idea be had, since the weather experienced from day to day depends almost wholly on the movement of these traveling eddies, cyclones, or areas of low pressure.

That one may gain a clear understanding of the difference between the movements of the air in the cyclone and the movement of the cyclone itself, or its translation from place to place, let him picture in his mind the solar system, with all of its planets and their satellites, turning each upon its own axis and pursuing its orbit about the sun, and then imagine the sun also as rotating and as moving forward in space without change in the relation of the planets to the sun, or the satellites to the planets, and he will have less difficulty in comprehending the various phases of the translation of a cyclonic system and the sequence in which the force and the direction of the wind changes; how the wind must blow into the front of the storm in a direction partly or wholly contrary to the movements of the storm itself and into the rear of the storm as it passes away; how the wind increases in velocity as it gyrates spirally about the center and approaches nearer and nearer the region where it must ascend; how centrifugal force, in causing the higher layers of air to move away from the center, tends to cause an accumulation of air about the outer periphery of the storm, which in turn presses downward and impels the surface air inward. This whole complex system of motion moves forward the same as does the sun and his system.

The black round disk indicates that the weather is cloudy at the moment of the observation, and the open disk clear sky. S. and R. stand for snow and rain. The large figures in the four quarters of the cyclone show the average temperature of each quadrant. The greatest difference is between the southeast and northwest sections. This is due in part to the fact that in the southeast quadrant the air is drawn northward from warmer latitudes, and in the northwest quadrant the air is drawn southward from colder latitudes.

Chart II, constructed from observations taken 12 hours later, shows that the storm or cyclonic center, as indicated by the word "low," has moved from central Iowa since 8 a. m. and is now, at 8 p. m., central over the southern point of Lake Michigan. The shaded areas show that precipitation has occurred during the past 12 hours in nearly the entire region covered by the cyclone. Unfortunately for the science of forecasting, precipitation does not show that relation to the configuration of the isobars that temperature, wind velocity, and wind direction do.

Note that none has fallen in the southern portion of Ohio, in northwest Missouri, and in West Virginia and eastern Kentucky, although they are near the storm center, while a fall has occurred in New England, quite remote from the center of barometric depression. These facts illustrate how a forecast of rain or snow may fail for a portion of a state or for a whole state, even though the storm pass over the state and the wind and temperature change precisely as predicted. However, all the places mentioned as failing to receive precipitation were showered upon during the further progress of the storm, except northwest Missouri, as will be seen by referring to chart III of the following morning. The cyclone has continued its course toward the northeast, and has brought the rain area eastward to include nearly the whole Atlantic coast region. The weather has cleared on the west side of the storm.

Charts II and III contain red lines,

which, like the dark shading, do not appear on chart I, which was purposely left clear of these symbols, so that the movement of wind in accordance with pressure gradients could be the better shown. These red lines connect places having the same temperature. Note how, on both charts, they trend from the Atlantic coast northwestward into the southeast quarter of the cyclone, and where they leave the storm center how precipitately they drop away toward the southwest. A cause can be easily found for this by examining the direction of the arrows. In the first case the isothermals are being pushed northward by southerly winds, and in the other forced southward by winds from the northwest. As the cyclone proceeds eastward the regions now under the influence of warm southerly winds will be, in less than 24 hours, on the west side of the storm, and cold northwest winds will sweep over them.

The line of arrows leading from western Wyoming to the center of the storm on chart III shows the place where the cyclonic circulation of wind began that constitutes the storm and the course pursued by the storm center. The small circles surrounding crosses mark the places where the storm was central at each 12-hour interval. The figure above the circle indicates the date, and the letter below evening or morning.

As previously explained, the large figures give the average temperature for each of the four quarters of the storm within a radius of 500 miles from the center. The same information may be gathered from the isotherms, but cannot be so strikingly presented. Now, remembering that the air ascends as it spirally moves around the center, one may see how the cold air of the northwest quarter is mingled with the warm air of the southeast portion, which in each of the three cases presented by the charts so far brought into the discussion is more than three times as warm. On chart III the two quarters are represented—one by 13 degrees and the other by 47 degrees. The mixing of such cold and such warm masses of air and the addition of cold due to expansion as the mixture rises is a fruitful cause of precipitation, but not the only one, for we see that rain has fallen in the Gulf states, as exhibited on chart III, probably only as the result of cold northwest winds flowing into and mingling with the warm air of the south. Precipitation may also occur as the result of the warm humid air of southerly winds underrunning cold and heavier air, and by other processes not yet understood.

ANTI-CYCLONIC STORMS

Attention is now directed to the *anti-cyclone* or high-pressure area shown on these three charts as resting over the Rocky Mountain plateau. Here all the functions of the cyclone are reversed; hence the name anti-cyclone. The air has a downward component of motion at and for a considerable area about the center, instead of an upward component; the winds blow spirally outward from the interior, instead of inward, and are deflected to the left of their initial direction, instead of to the right, and the air is mostly clear, cool, and dry, instead of cloudy, warm, and humid. The center of this high moved but little during the three 12-hour periods, but its area expanded eastward as the low advanced, and if the chart of December 17, 8 p. m., were shown the high pressure would be seen to cover with clear, cool weather the region now embraced within the limits of the low pressure.

These are winter conditions that are being described. The storms are general, not local, as in summer, when the highs and the lows exhibit small differences of pressure, move slowly, and seldom embrace large areas. The summer type of local storms gradually merges into general storms as the heat of summer wanes, the first general rainstorms usually occurring during the latter part of September. This has given rise to the erroneous idea of an "equinoxial storm."

HOT WAVES

For some reason there come, in summer, periods of stagnation in the drift of the highs and the lows. At such times, if a high sluggishly rests over the south Atlantic Ocean between Bermuda and the coast of the United States and a low over the northern Rocky Mountain region, there will result what is popularly known as a warm wave, for the air, on account of its slightly greater specific gravity, will slowly and steadily flow from the southeast, where the pressure is greater, toward the northwest, where the pressure is less, and, receiving constant accretions of heat from the hot, radiating surface of the earth, without any cyclones to mix the upper and lower strata, will finally attain a temperature almost unbearable to animal life. This superheated condition of the lower stratum in which we live continues until the high over the ocean dies out or drifts away to the east and the low-pressure area in the northwest begins to gyrate as a cyclone and moves eastward, mixing in its course strata of unequal temperatures and precipitating the cool and welcome thunder showers.

COLD WAVES

Chart IV shows the beginning of a cold wave in the northwest on the morning of January 7, 1886. Observe that the heavy, black isobar passing through Montana is marked 30.9, while the isobar curving through southern Texas is marked 29.8, a difference of 1.1 inch in the air pressure between Montana and Texas. The red isothermal line in Montana is marked 30 degrees below zero, while the isotherm on the Texas coast indicates a temperature of 50 degrees.

The people of the Gulf states, with a morning temperature of 40 to 50 degrees, knew nothing of the great volume of extremely cold air to the northwest of them; but from the distribution of air pressure shown by chart IV the forecaster anticipated that the cold air of the northwestern states, on account of its great weight, would be forced southward to the Gulf and eastward to the Atlantic Ocean, or, more accurately speaking, that the conditions causing the cold in the northwest would drift southward and eastward. He therefore issued the proper warning to the threatened districts.

Now turn to chart V of the following morning, and it will be seen that the cold wave has covered the entire Mississippi Valley. The 10-degree isothermal line has been forced southward almost to Galveston, where the temperature the preceding morning was 50 degrees.

The low shown on the preceding chart as being central in southern Texas has moved northeastward to Alabama and on chart V appears as a fully developed storm. The difference in pressure between the central isobar of the low and the central isobar of the high is now 1.4 inches.

The low is lower and the high is higher—conditions that argue ill for the coast line toward which the low is moving. Next look at the arrows at the coast stations from Key West, Florida, to Eastport, Maine; they are found to have short bars at one end, which indicate that every port, large and small, between these two places is flying danger signals, and that every promontory or island along this vast stretch of seashore will exhibit the warning lights of the Weather Bureau as soon as night falls.

Twenty-five years ago mariners depended on their own weather lore to warn them of coming storms; then, although the number of ships plying the seas was much less than it is now, every severe storm that swept across them left death and destruction in its wake, and for days afterward the dead were cast up by the subsiding waters and the shores were lined with wreckage. Happily this is not now the case. The angry waters and the howling winds vent their fury the one upon the other, while the great mass of shipping, so long the prey of the winds and the waves, rides safely at anchor in convenient harbors.

The large figures in the four quarters of the low again strikingly illustrate how great may be the difference in temperature, under cyclonic influence, between regions separated by but short distances. It is certain that as the low or cyclonic whirl moves toward the northeast, along the track usually followed by storms in this locality, the cold of the northwest quadrant, by the action of the horizontally whirling disk of air that constitutes the low, will be driven southeastward toward Florida, lowering the temperature in the orange groves to below the freezing point.

Chart VI shows that the center of the cyclone has moved during the preceding 24 hours northeast to the coast of New Jersey, with greatly increased energy, the barometer at the center showing the abnormally low reading of 28.7 inches. Cold northwest winds, as shown by the arrows, are now blowing systematically from the high-pressure area of the northwestern states southeast to Florida and the South Atlantic coast. The red isotherm of 30 degrees passes through the northern part of Florida, where, on the day before, the temperature was over 50 degrees. The cyclonic gyration of this storm extends 1,000 miles inland and probably to an equal distance out to sea. Heavy snow or rain has fallen throughout the area under its influence, seriously impeding railroad travel, and a gale of hurricane force has prevailed on the coast; but when, on the day preceding, the storm was central in Alabama all these conditions were foreseen and the necessary warnings issued.

Chart VII shows the conditions 24 hours later. The storm center, as shown by the line of arrows, has been three days in passing from southern Texas to the mouth of the St Lawrence. The temperature has fallen still lower on the Atlantic coast and in Florida as the result of uninterrupted northwest winds, and no material rise in temperature can occur until the high pressure of the northwest is replaced by a low pressure, and convectional currents are drawn toward the northwest instead of being forced southward from that region.

When the charts indicate the formation of a large volume of dense, cold air in the northwest, as shown by the barometer readings, the skilled forecaster is on the alert. He calls for special observations every few hours from the stations within and directly in advance of the cold area, and as soon as he becomes convinced that the cold wave will sweep across the country with its attendant damage to property, destruction to animal life, and discomfort to humanity, the well-arranged system of disseminating warnings is brought into action, and by telegraph, telephone, flags, bulletins, maps, and other agencies the people in every city, town, and hamlet, and even in farming settlements, are notified of the advancing cold 12, 24, or even 36 hours before it reaches them; and it is safe to say that $10,000,000 is a low estimate to make of the value of the perishable property that is protected in the United States as the result of the warnings that are distributed by the government in advance of the coming of only one of several severe cold waves that occur each winter.

In the late spring and early fall the highs or anti-cyclones, while possessing less energy than in the winter, may at times bring down to the earth such unseasonably cold air as to cause injurious or destructive frosts, the frosts being caused not necessarily by the cool air of the high, but by the clearness of the air, which allows a free escape of heat from the earth by radiation at night. As in the case of cold waves, warnings are widely distributed in advance of the high that may cause frosts, with great profit to the growers of tender fruits and vegetables.

In a general way the degree of cold in a cold wave, or rather the departure of the temperature from the normal of the season, will be proportional to the height of the barometer, and a necessary concomitant of a cold wave is an area of low pressure immediately in advance of the high pressure, the upward movement in one increasing the downward motion of the other; and the greater the difference in the barometer between the two the greater the velocity with which the air will gyrate about and into the low, and the greater the downward and outward movement of the air in the high, and the more intense the cold. It therefore follows that a high that is not preceded by an active low will have a less degree of cold for a given pressure, and that the extent and intensity of cold waves depends considerably on the form and the characteristics of the preceding low and its location; if north of the center of the country the cold that follows will not reach the Gulf states in severe form, if at all; but if a low of considerable energy forms in the region of Texas and moves northeastward to the Atlantic coast, as nearly all lows do that originate in this region, and a high of equal intensity develops at the same time over the northern plateau of the Rocky Mountains, the latter will be drawn far to the south as the former moves out of the way toward the east, and cold northwest winds, driven by the high and attracted by the low, flow into the Gulf of Mexico itself, even reaching the islands of the West Indies.

It would be impossible for a cold wave to come upon the Pacific Coast states with the highs that drift in from the ocean, because of the warming effect of the water upon the air to considerable elevations; but frosts and cold waves visit the interior valleys of California and other coast states and reach almost to the ocean's edge. They are due to highs that move southward and then eastward along the plateau. The highs may be moving eastward very slowly, but the diameter of the areas covered by them may increase so rapidly that some cold air is pushed over the mountain tops and flows from the northeast into the interior valleys of the coast states.

The U. S. Weather Bureau has adopted certain arbitrary thermal limits to determine what constitutes a cold wave. Both the extent of the fall of temperature and the degree of cold that must be reached vary for season and place. For example, in December, January, and February a cold wave in the northern Rocky Mountain region occurs when the temperature falls 20 degrees in 24 hours and reaches a minimum of zero or lower; in Tennessee a fall of 20 degrees, and to 20 degrees or lower is required, while along the Gulf coast a fall of but 16 degrees and to 32 degrees constitutes a cold wave. The fall in temperature is reckoned from any given hour of one day to the same hour of the next day or from the minimum of one day to the minimum of the next.

The area and the intensity of cold waves depend upon the size of continents and their distance from the tropics. The interior of North America and of Siberia have geographic conditions that cause the most severe cold waves of any parts of the world. If the elevation of the Rocky Mountain plateau in North America were one-half of what it is and if the mountain chains were leveled away, or even trended to the east and west instead of north and south, the vaporous atmosphere of the Pacific, which extends upward but a very short distance and which decreases in density rapidly with elevation, because of the inability of water to exist in the vaporous form in considerable quantities except under the action of the comparatively high temperatures of the thin stratum near the earth, would flow far into the interior of the continent, and by absorbing the heat of the sun during the day and restricting radiation from the earth at night markedly decrease the severity of cold waves and other changes in temperature. Hence it is seen that the height of mountain systems and their trend relative to large bodies of water and to the prevailing direction of winds are important factors in the causing of cold waves.

As stated before, the air has a downward movement in the anti-cyclone, which may be so feeble as to cause only a slight change in temperature at the earth, or it may be active enough to lower the temperature down to the frost line in spring or fall, or even have such energy as to cause a cold wave in winter. In the latter case the air possesses such intense cold at the elevation from which it is drawn that, notwithstanding the fact that it gains heat by compression at the rate of about 1 degree for each 200 feet of descent, it is still far below normal temperature when it reaches the earth. Its initial temperature is so low that it can contain only a minute portion of water vapor; it therefore evaporates all fog or cloud as it gains in temperature during its fall, and by flowing away laterally along the earth it drives away the more humid air of the lower strata. The downward motion thus introduces conditions of clearness and deficiency of water vapor that promotes free radiation and the loss of much of the heat dynamically gained as well as that given off by the earth to the air. It therefore seems that departures from the normal temperature of a time and place are the result of *the motions of the air* below the height of 10 miles. Ascending and descending currents cease before this altitude is reached, and it is probable that the temperature of this region changes but little from season to season and from year to year, although short-period observations with the bolometer, which registers changes in the amount of heat that falls upon the outer limits of the air, indicate that in time it possibly may be necessary to modify this opinion.

Few people realize that the cold wave has an important therapeutic value. It scatters and diffuses the carbonic-acid gas exhaled by animal life and the fetid gas emanating from decaying organic matter. Its dense air not only gives more oxygen with each inspiration of the lungs, but the high electrification that always accompanies it invigorates man and all other animal life. The cold north wind, if it be dry, as it usually is, brings physical energy and mental buoyancy in its pure but boisterous breath.

HURRICANES

Most of the storms that gain such a velocity of gyration as to consitute hurricanes originate in the tropics and move northwestward to latitude 26 degrees to 32 degrees, where they recurve and move toward the northeast. These are the most severe of all the storms that visit the North American continent. The West Indies and the Philippines are the regions wherein these forceful storms originate in the greatest numbers, and the commerce of all nations has profited largely by the spirit that has prompted the United States to establish, since 1898, a complete system of cable-reporting meteorological stations in both of these sections, which enables a central station to keep mariners advised of danger.

At times hurricanes remain several days in the Gulf of Mexico or off our South Atlantic coast, and the only indication we have of their proximity is a strong suction drawing the air briskly over some of our coast stations toward the center of the storm. Again, a heavy ocean swell may be caused by the friction of the rapidly gyrating air on the surface of the water, and when the hurricane has a slow progressive movement, as it usually has south of latitude 30 degrees, this swell may be propagated outward from the center of the storm faster than the storm is moving and reach the coast several hours before either the barometer or the wind movement gives any indication of the coming storm.

The tracks of West Indian hurricanes are usually in the form of parabolas. These storms come from the southeast, but on reaching the latitude of our Gulf coast they, as a rule, recurve to the northeast and pass along our coast line or near to it.

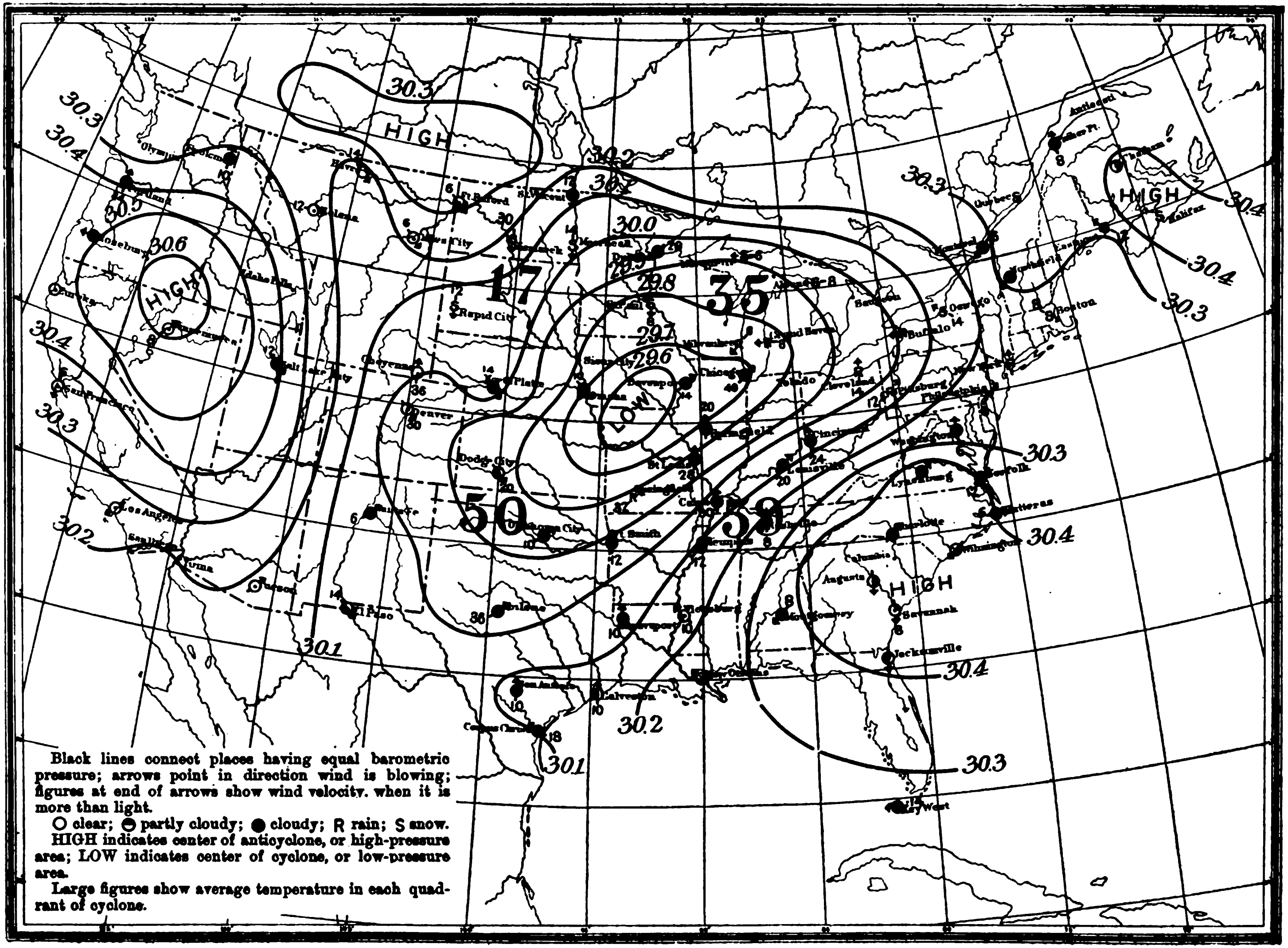
Chart VIII shows a West Indian hurricane just making its advent into Florida. The effect of the storm is felt as far north as Wilmington, where the wind is being drawn from the northeast at the rate of 24 miles per hour, and danger warnings, as indicated by the bars on the arrows, are being displayed as far north as Norfolk, both at the regular observation stations of the Weather Bureau and at all the numerous large and small harbors of the South Atlantic coast. The winds at Savannah and Jacksonville are moving from the northeast and north, respectively, at 20 miles per hour, which is four miles less than at Wilmington, farther away from the storm center. This apparent inconsistency may be due to the low and restricted exposure of the instruments at the nearer stations, but not necessarily so, as the winds never blow into or around a storm at velocities that are evenly and consistently in accord with the pressure gradients, but rather in the form of rising and falling gusts.

Observe that there are no warnings flying at Key West; this is because the storm center is moving away, and the wind cannot therefore reach any higher velocity than it now has, and must steadily decline.

In studying the winds about this storm center, or rather about such part of it as projects over the land, recall the story about Franklin's northeast storm. It will be seen how it is possible for storms to progress against the wind. In thunder-storms this rule does not hold. They cover but an infinitesimal area in comparison with a cyclone, and there is a horizontal rolling of the atmosphere, caused by cold and heavy air from above breaking through into a lighter superheated stratum next the earth. This rolling motion throws forward the cool air in the direction in which the cloud is moving.

Chart IX shows a slight aberration in the northeast course of the storm, which places the center inland, so that the whole cyclone can be charted. From eastern Florida the usual course is northeast over the ocean instead of up through Georgia and the Carolinas. What caused this storm to depart from the usual course? The reason can be easily found, and it is important that one should find it. The high over New England and the contiguous ocean had a tendency to crowd the storm inland and cause it to seek the route of least resistance, and the low over the Lake region attracted it. That is the reason; it will be made plainer when we come to consider the translation of storms.

The storm has been destructive to marine property, the wind at Savannah reaching 72 miles per hour, and 48 miles at Jacksonville, and warnings are now displayed at all ports northward to New England, as the hurricane will move northward between the two highs along the lines of least pressure. Chart X shows that it traveled from northern Georgia to central New York during the next 24 hours. The storm center passing northward over the land instead of the water, the hurricane winds on the water were onshore—a condition that strewed the coast with the wreckage of many vessels that were unable to see the warning signals in time to seek har-


HIGH
HIGH
HIGH
HIGH
LOW
17
35
50
38
30.0
29.9
29.8
29.7
29.6
30.1
30.1
30.2
30.2
30.2
30.3
30.3
30.3
30.3
30.3
30.3
30.4
30.4
30.4
30.4
30.4
30.4
30.5
30.6
Olympia
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
El Paso
Salt Lake City
Idaho Falls
Helena
Havre
Ft. Buford
Miles City
Bismarck
St. Vincent
Moorhead
Duluth
Rapid City
Cheyenne
North Platte
Denver
Dodge City
Santa Fe
Abilene
San Antonio
Corpus Christi
Galveston
Shreveport
Vicksburg
New Orleans
Montgomery
Augusta
Savannah
Jacksonville
Key West
Charlotte
Wilmington
Hatteras
Norfolk
Lynchburg
Washington
Philadelphia
New York
Harrisburg
Buffalo
Oswego
Boston
Northfield
Montreal
Quebec
Father Pt.
Anticosti
Chatham
Halifax
Eastport
Chicago
Milwaukee
Grand Haven
Marquette
Alpena
Saugeen
Toledo
Cleveland
Cincinnati
Louisville
Nashville
Memphis
Cairo
St. Louis
Springfield
Kansas City
Oklahoma City
Ft. Smith
Davenport
Omaha
Sioux City
St. Paul

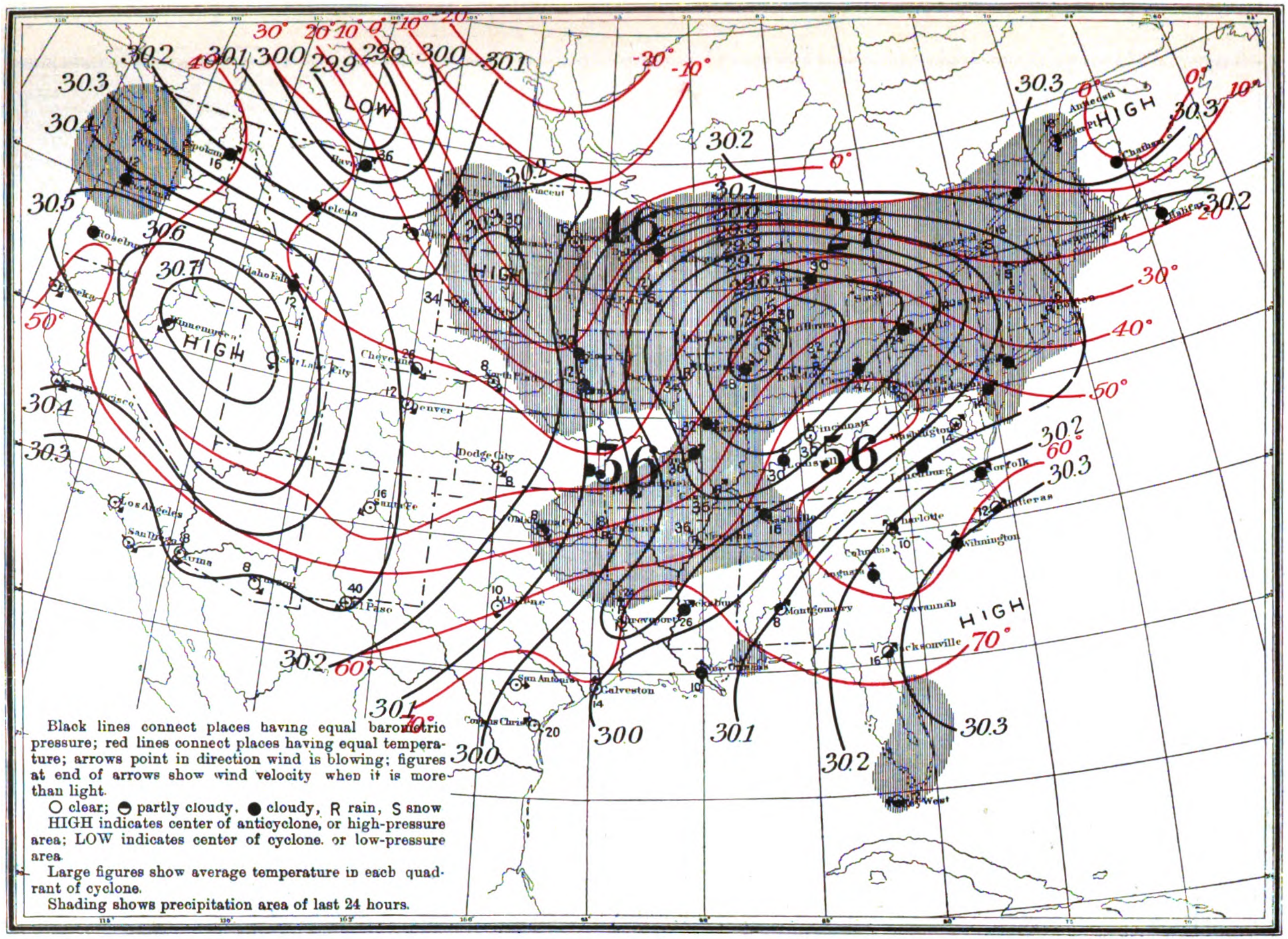
Black lines connect places having equal barometric pressure; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◒ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

CHART I.—Winter Storm, December 15, 1893, 8 A. M.


HIGH
LOW
HIGH
LOW
HIGH
HIGH
16
27
56
56
30.3
30.4
30.5
30.6
30.7
30.2
30.1
30.0
29.9
29.7
29.6
29.5
30°
20°
10°
0°
-10°
-20°
40°
50°
60°
70°
Spokane
Helena
Havre
Idaho Falls
Winnemucca
Salt Lake City
Cheyenne
Denver
North Platte
Dodge City
Santa Fe
Los Angeles
San Diego
Yuma
El Paso
Abilene
San Antonio
Corpus Christi
Galveston
New Orleans
Shreveport
Vicksburg
Montgomery
Savannah
Jacksonville
Key West
Augusta
Columbia
Charlotte
Wilmington
Hatteras
Norfolk
Lynchburg
Washington
Cincinnati
Louisville
Anticosti
Chatham
Halifax
Roseburg

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity when it is more than light.

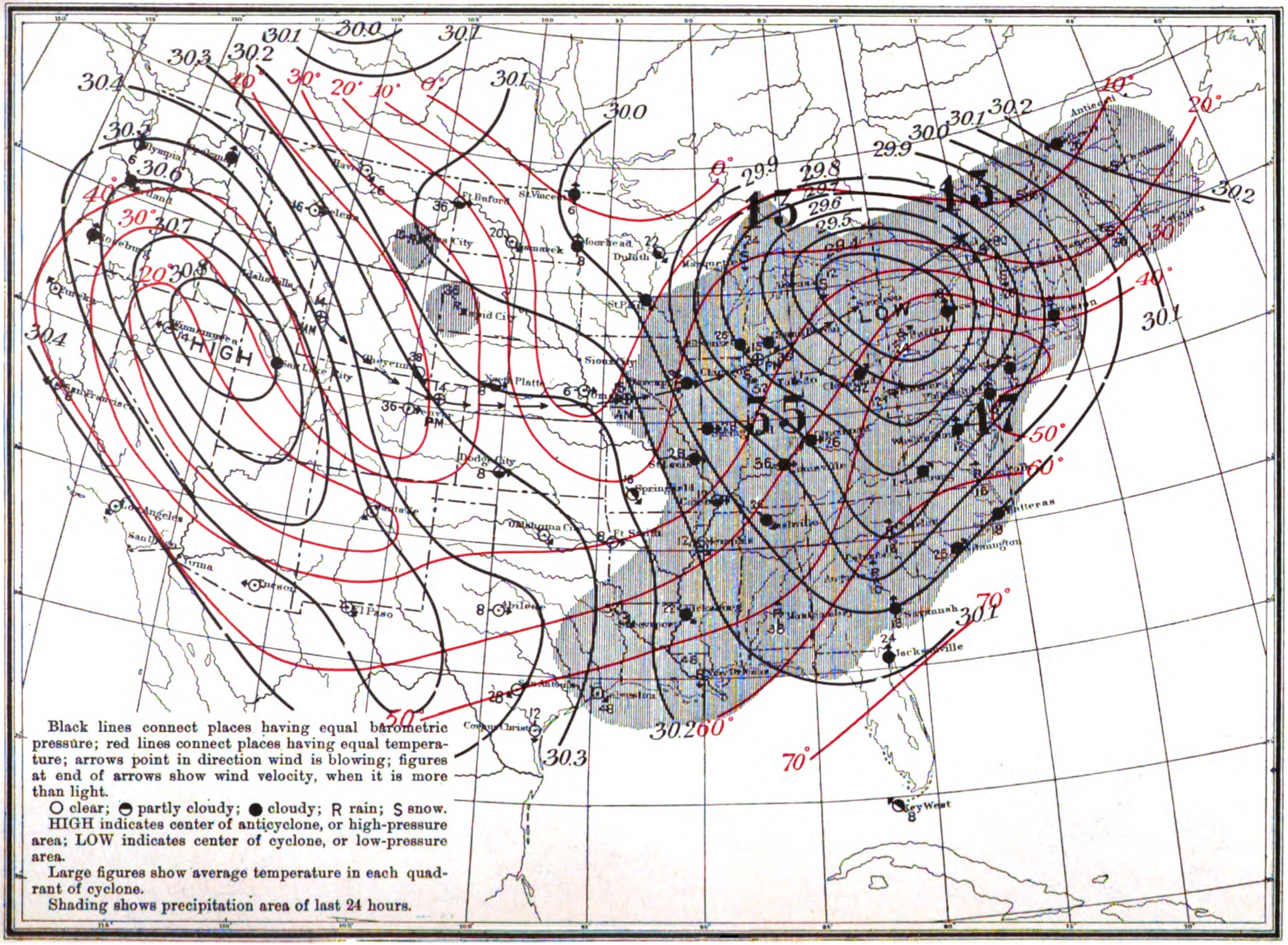
○ clear; ◓ partly cloudy, ● cloudy, R rain, S snow

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.

CHART II.—Winter Storm, December 15, 1893, 8 P. M.


HIGH
LOW
55
47
15
13
30.4
30.3
30.2
30.1
30.0
29.9
29.8
29.7
29.6
29.5
29.4
30.5
30.6
30.7
30.8
0°
10°
20°
30°
40°
50°
60°
70°
Olympia
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
El Paso
Winnemucca
Idaho Falls
Salt Lake City
Helena
Havre
Ft. Buford
St. Vincent
Moorhead
Duluth
Bismarck
Rapid City
Cheyenne
Denver
North Platte
Omaha
Sioux City
St. Paul
Marquette
Dodge City
Oklahoma City
Ft. Smith
Springfield
Abilene
San Antonio
Corpus Christi
Galveston
Jacksonville
Savannah
Hatteras
Washington
Key West
Antecosti

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

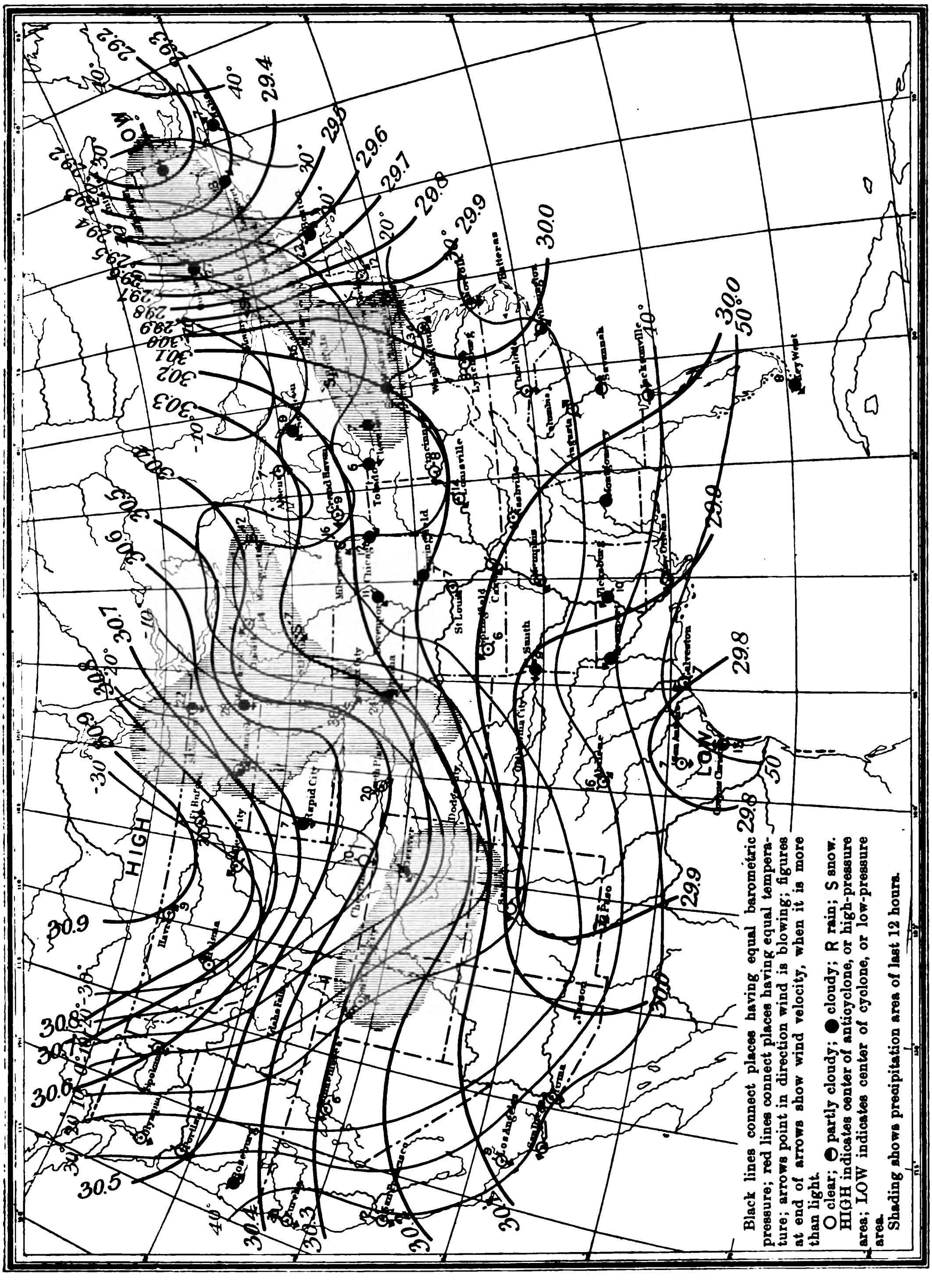
○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.

CHART III.— Winter Storm, December 16, 1893, 8 A. M.


LOW
HIGH
LOW
29.2
29.3
29.4
29.5
29.6
29.7
29.8
29.9
30.0
30.1
30.2
30.3
30.4
30.5
30.6
30.7
30.8
30.9
Rapid City
Chicago
St Louis
Dodge City
Galveston
Savannah
Jacksonville
Key West
Los Angeles

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◐ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART IV.—Cold Wave, January 7, 1886, 7 A. M.

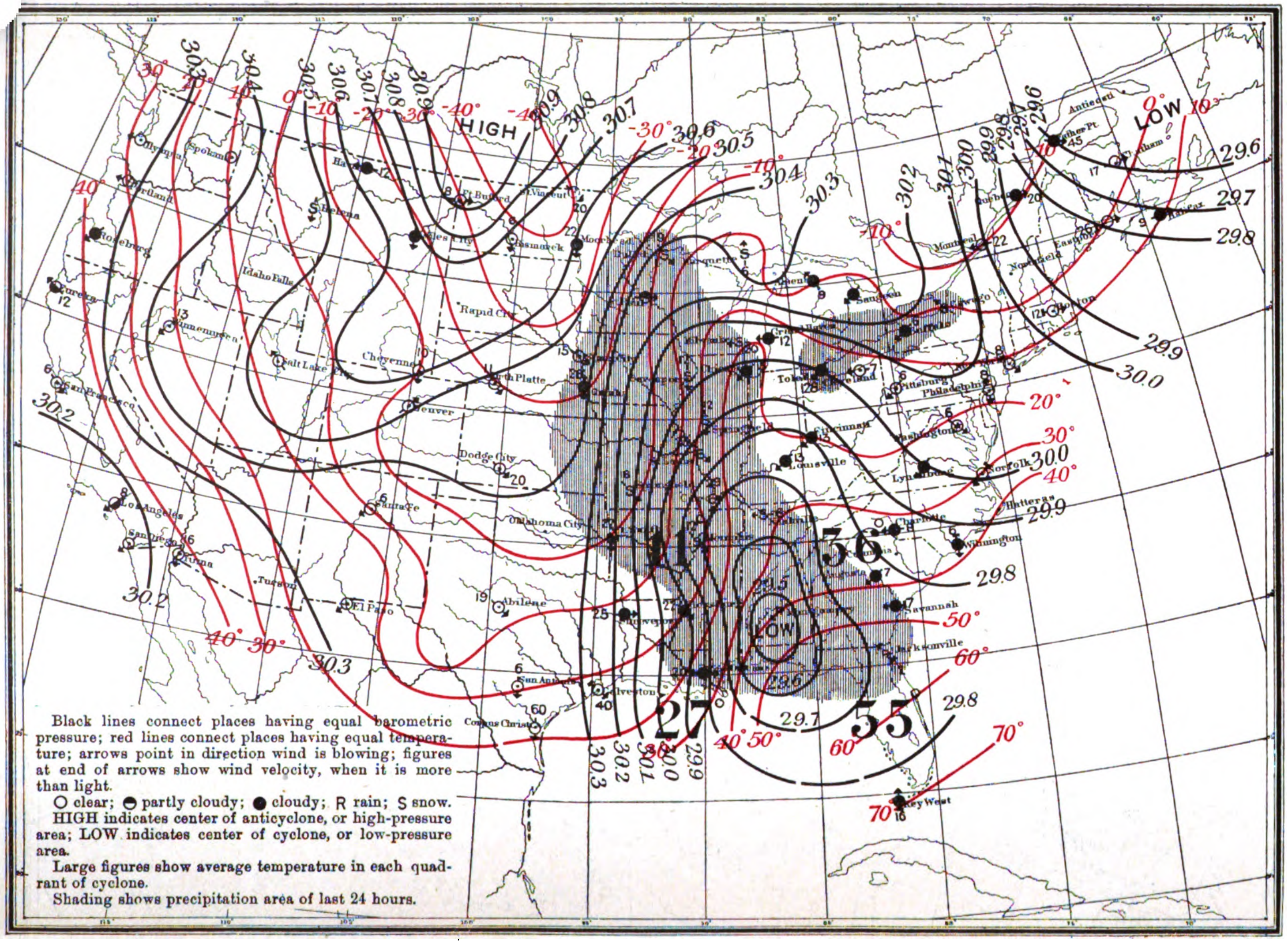

HIGH
LOW
LOW
30.9
30.8
30.7
30.6
30.5
30.4
30.3
30.2
30.1
30.0
29.9
29.8
29.7
29.6
-40°
-30°
-20°
-10°
0°
10°
20°
30°
40°
50°
60°
70°
27
41
36
55
Olympia
Spokane
Portland
Roseburg
Eureka
Winnemucca
San Francisco
Los Angeles
San Diego
Yuma
Tucson
El Paso
Santa Fe
Salt Lake City
Idaho Falls
Helena
Havre
Ft Buford
St Vincent
Miles City
Bismarck
Moorhead
Rapid City
Cheyenne
North Platte
Denver
Dodge City
Oklahoma City
Abilene
San Antonio
Corpus Christi
Galveston
Marquette
Toledo
Cleveland
Buffalo
Cincinnati
Louisville
Pittsburg
Philadelphia
Washington
Lynchburg
Norfolk
Hatteras
Charlotte
Wilmington
Savannah
Jacksonville
Key West
Montreal
Quebec
Northfield
Eastport
Boston
Father Pt.
Anticosti
Chatham

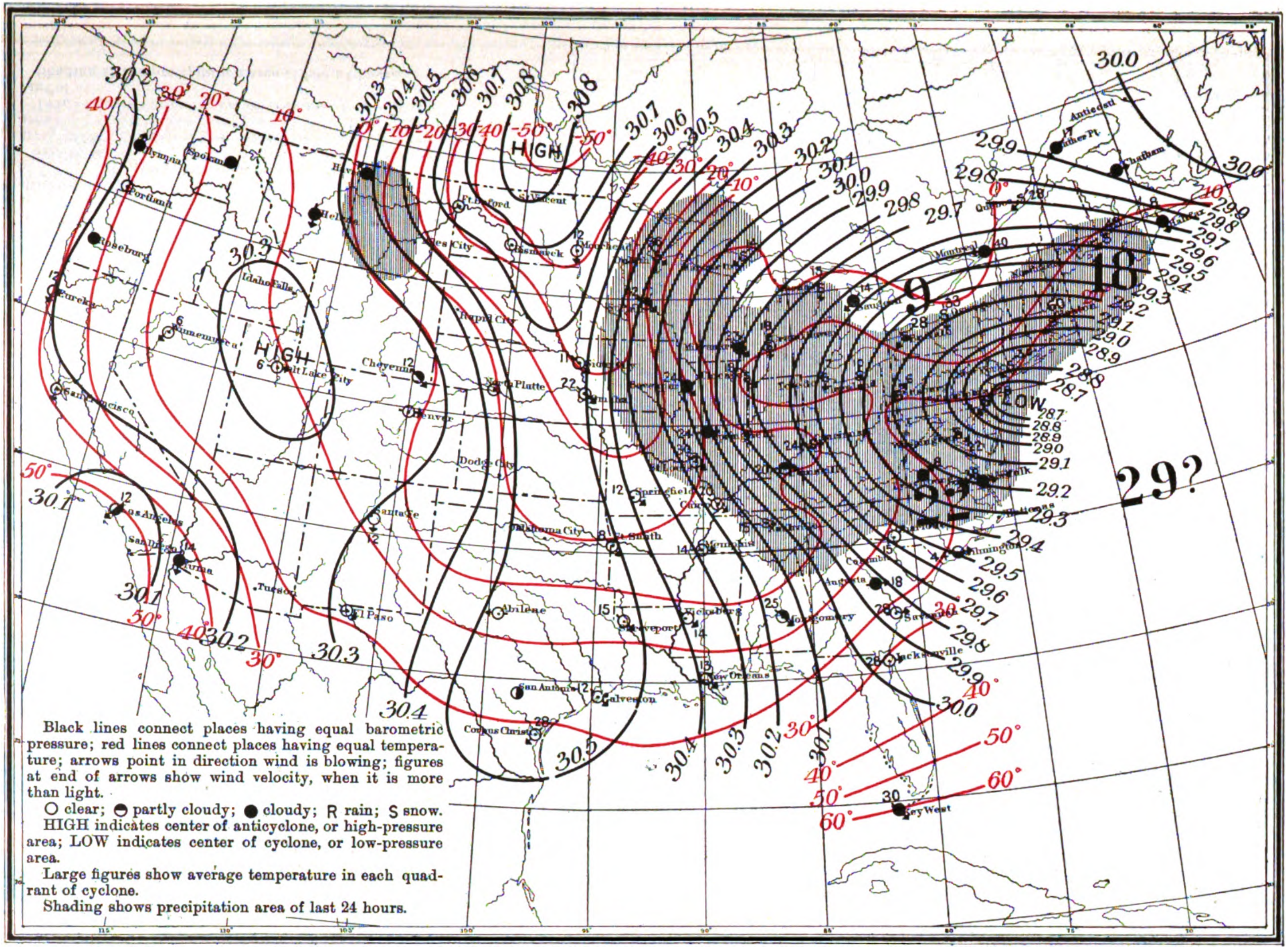
CHART V.—Cold Wave, January 8, 1886, 7 A. M.

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow. HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.


HIGH
HIGH
LOW
18
9
52
29?
30.0
29.9
29.8
29.7
29.6
29.5
29.4
29.3
29.2
29.1
29.0
28.9
28.8
28.7
30.1
30.2
30.3
30.4
30.5
30.6
30.7
30.8
-50°
-40°
-30°
-20°
-10°
0°
10°
20°
30°
40°
50°
60°
Antiesti
Father Pt.
Chatham
Quebec
Montreal
Eastport
Boston
Albany
New York
Washington
Norfolk
Wilmington
Charleston
Augusta
Savannah
Jacksonville
Key West
Atlanta
Montgomery
New Orleans
Vicksburg
Memphis
Nashville
Cairo
Shreveport
Galveston
San Antonio
Corpus Christi
Abilene
El Paso
Tucson
Yuma
San Diego
Los Angeles
San Francisco
Eureka
Roseburg
Portland
Olympia
Spokane
Helena
Idaho Falls
Winnemucca
Salt Lake City
Cheyenne
Denver
Santa Fe
Dodge City
Oklahoma City
Fort Smith
Springfield
North Platte
Omaha
Sioux City
Rapid City
Miles City
Ft. Buford
Bismarck
Moorhead
St. Vincent
Havre
Chicago

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

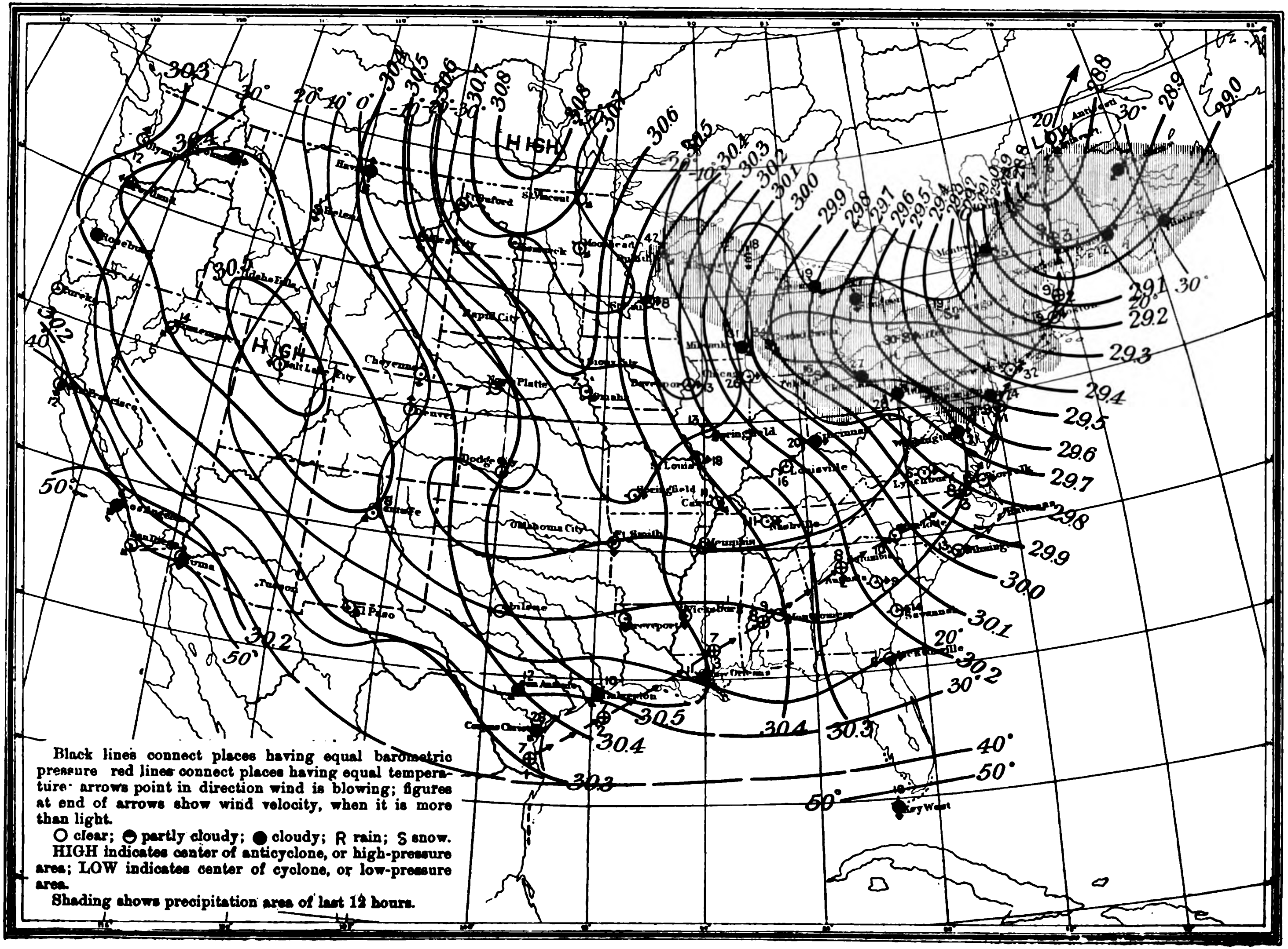
○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.

CHART VI.—Cold Wave, January 9, 1886, 7 A. M.

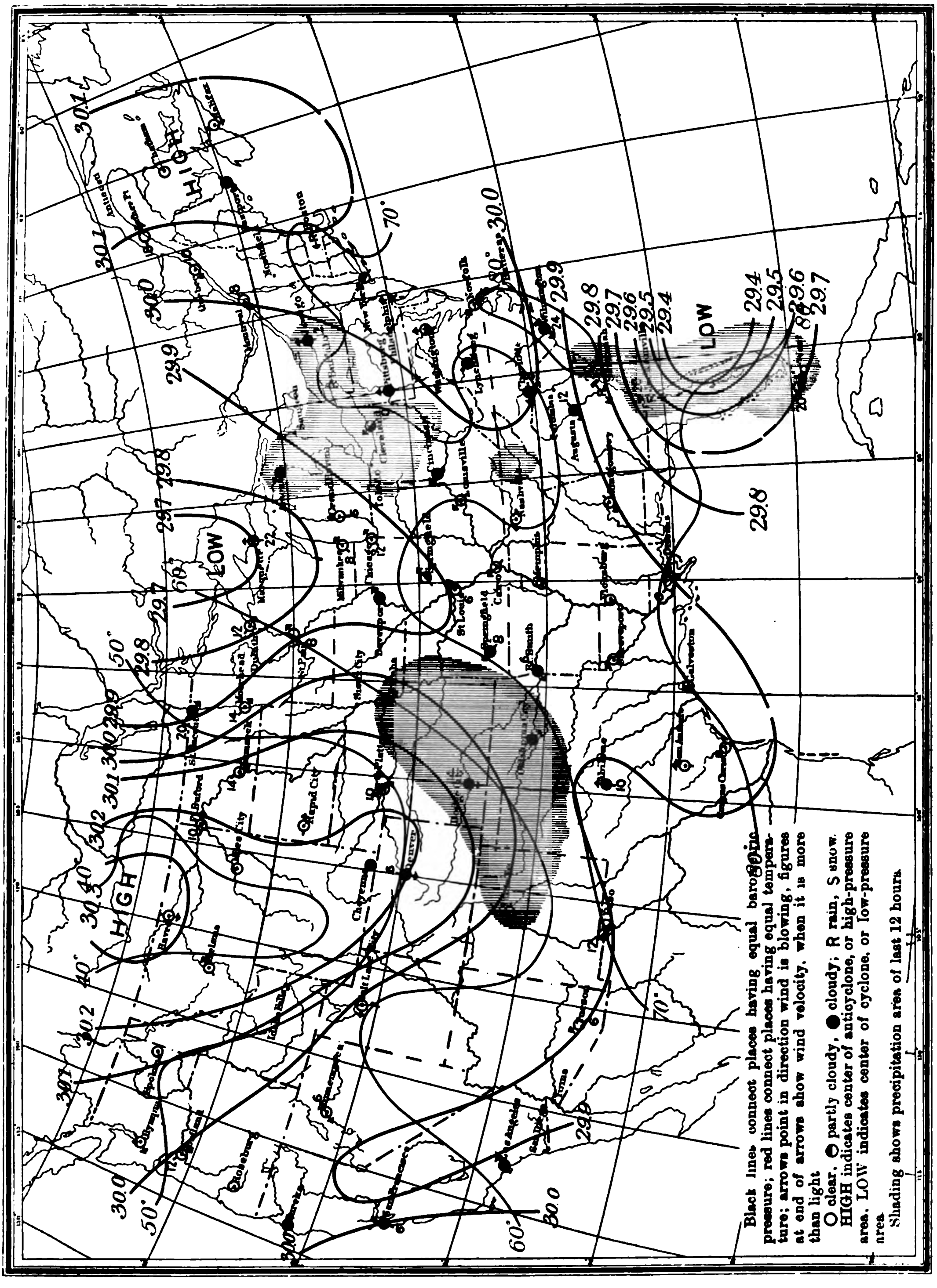

HIGH
HIGH
LOW
30.3
30.4
30.5
30.6
30.7
30.8
30.2
30.1
30.0
29.9
29.8
29.7
29.6
29.5
29.4
29.3
29.2
29.1
29.0
28.9
28.8
50°
40°
30°
20°
10°
0°
-10°
-20°
Olympia
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
El Paso
Salt Lake City
Idaho Falls
Winnemucca
Helena
Havre
Ft. Buford
St. Vincent
Bismarck
Moorhead
Duluth
Rapid City
Cheyenne
North Platte
Denver
Dodge City
Santa Fe
Oklahoma City
Abilene
Omaha
Sioux City
Davenport
St. Paul
Milwaukee
Chicago
Springfield
St. Louis
Cairo
Cincinnati
Louisville
Nashville
Memphis
Ft. Smith
Vicksburg
Shreveport
Galveston
San Antonio
Corpus Christi
New Orleans
Montgomery
Augusta
Savannah
Jacksonville
Key West
Lynchburg
Norfolk
Washington
Wilmington
Charlotte
Hatteras
Boston
Montreal
Anticosti

Black lines connect places having equal barometric pressure red lines connect places having equal temperature· arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◐ partly cloudy; ● cloudy; R rain; S snow. HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART VII.—Cold Wave, January 10, 1886, 7 A. M.

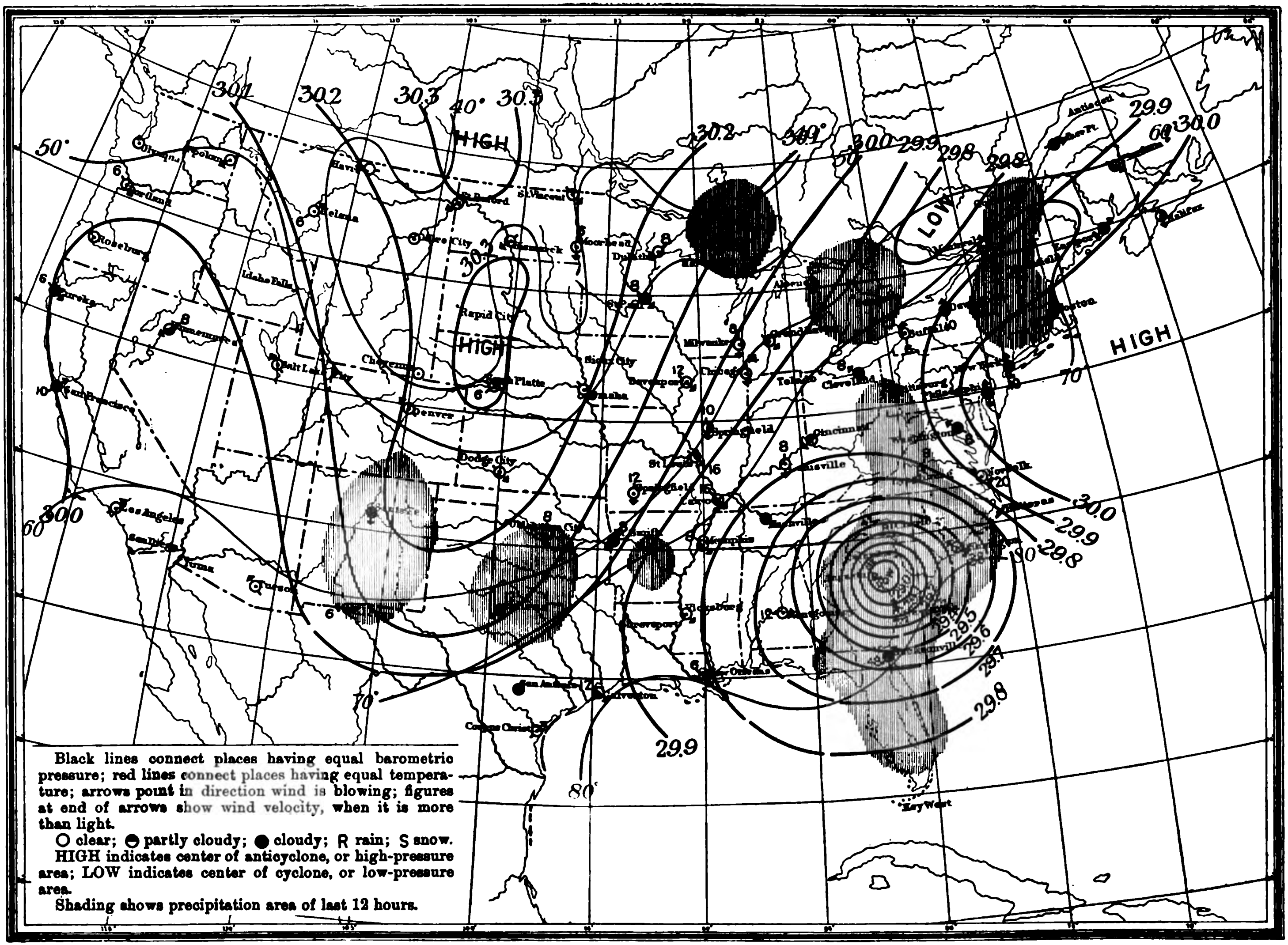

HIGH
LOW
LOW
HIGH
30.1
30.0
29.9
29.8
29.7
29.6
29.5
29.4
30.2
30.3
30.4
50°
60°
70°
80°

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing, figures at end of arrows show wind velocity, when it is more than light

○ clear, ◓ partly cloudy, ● cloudy; R rain, S snow. HIGH indicates center of anticyclone, or high-pressure area. LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART VIII.—West Indian Hurricane, August 27, 1893, 8 A. M.


30.1
30.2
30.3
40°
30.3
HIGH
50°
30.2
30.1
50
30.0
29.9
29.8
29.8
LOW
29.9
60
30.0
HIGH
70
30.0
29.9
29.8
80
29.7
29.6
29.5
29.8
29.9
80°
70°
60
30.0
HIGH
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
Idaho Falls
Helena
Havre
Salt Lake City
Cheyenne
Denver
Rapid City
North Platte
Dodge City
Moorhead
Duluth
Bismarck
Omaha
Sioux City
Davenport
Chicago
Milwaukee
Toledo
Cleveland
Buffalo
Pittsburg
Philadelphia
New York
Boston
Cincinnati
Evansville
Springfield
St Louis
Cairo
Nashville
Memphis
Vicksburg
Shreveport
New Orleans
Galveston
San Antonio
Corpus Christi
Norfolk
Hatteras
Jacksonville
Key West
Halifax
Anticosti
Father Pt.
Montgomery

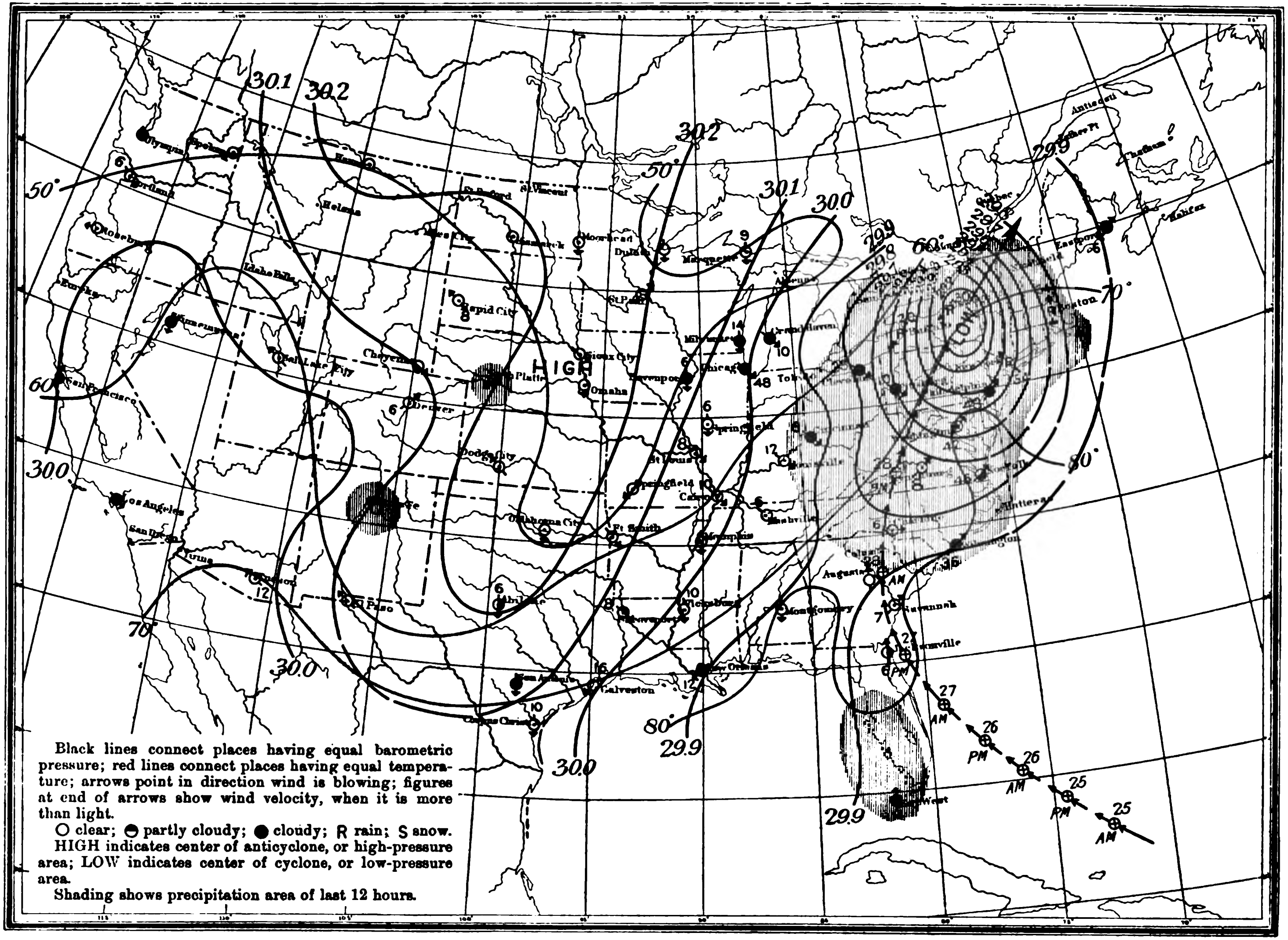
Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◐ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART IX.—West Indian Hurricane, August 28, 1893, 8 A. M.


30.1
30.2
30.2
30.1
30.0
29.9
29.9
29.9
30.0
30.0
30.0
50°
50°
60°
60°
70°
70°
80°
80°
HIGH
LOW
Olympia
Spokane
Portland
Roseburg
Eureka
Winnemucca
San Francisco
Los Angeles
San Diego
Yuma
Helena
Havre
Idaho Falls
Salt Lake City
Cheyenne
Denver
Rapid City
Bismarck
Moorhead
Duluth
Marquette
St Paul
Sioux City
Omaha
Davenport
Chicago
Milwaukee
Grand Haven
Toledo
Springfield
St Louis
Cairo
Nashville
Memphis
Dodge City
Oklahoma City
Ft Smith
Abilene
El Paso
Santa Fe
Tucson
San Antonio
Galveston
Corpus Christi
Shreveport
Vicksburg
New Orleans
Montgomery
Augusta
Savannah
Jacksonville
Key West
Hatteras
Boston
Eastport
Halifax
Quebec
Anticosti
Father Pt
Chatham
Alpena
25 AM
25 PM
26 AM
26 PM
27 AM

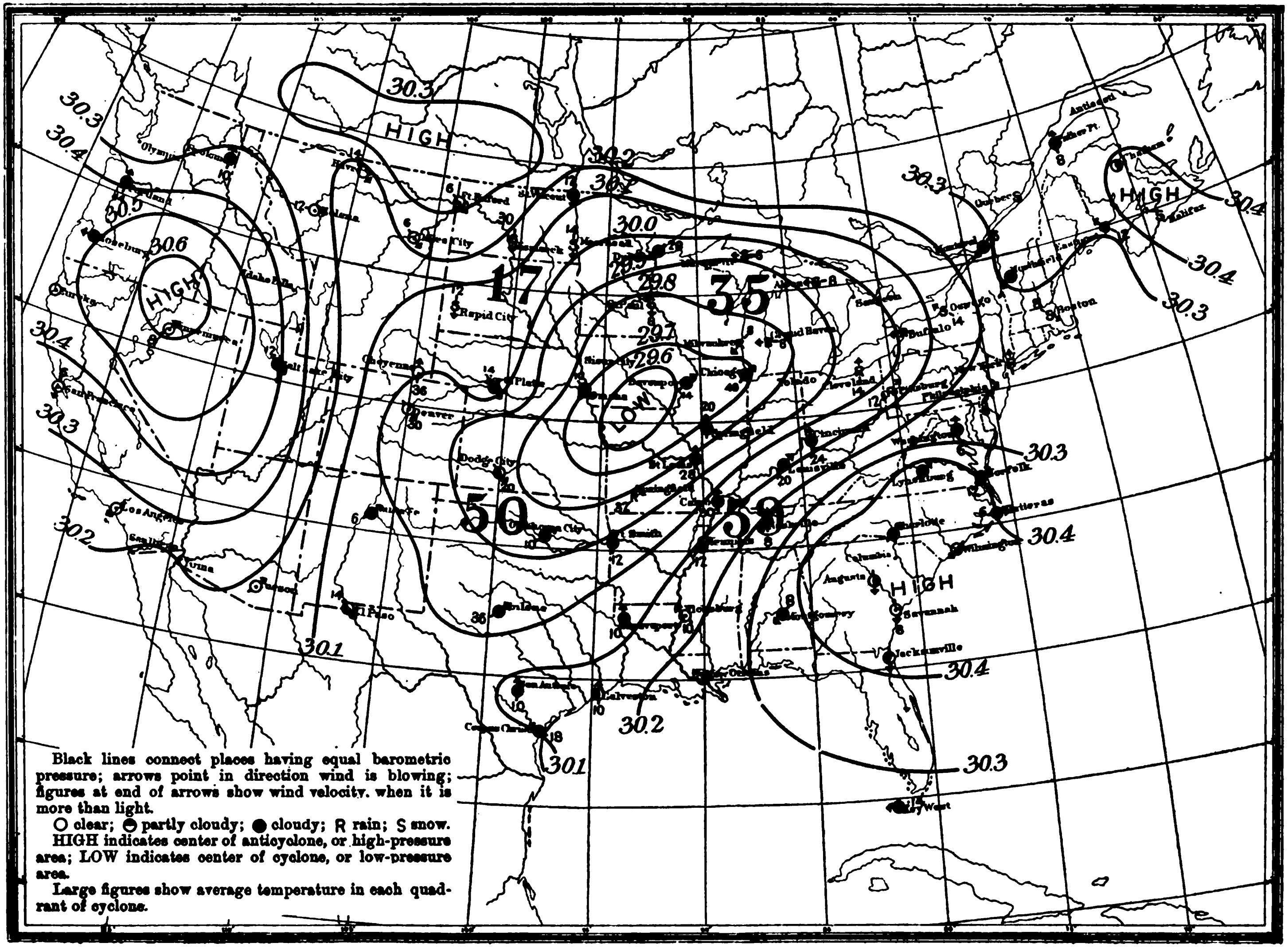
Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART X.—West Indian Hurricane, August 29, 1893, 8 A. M.

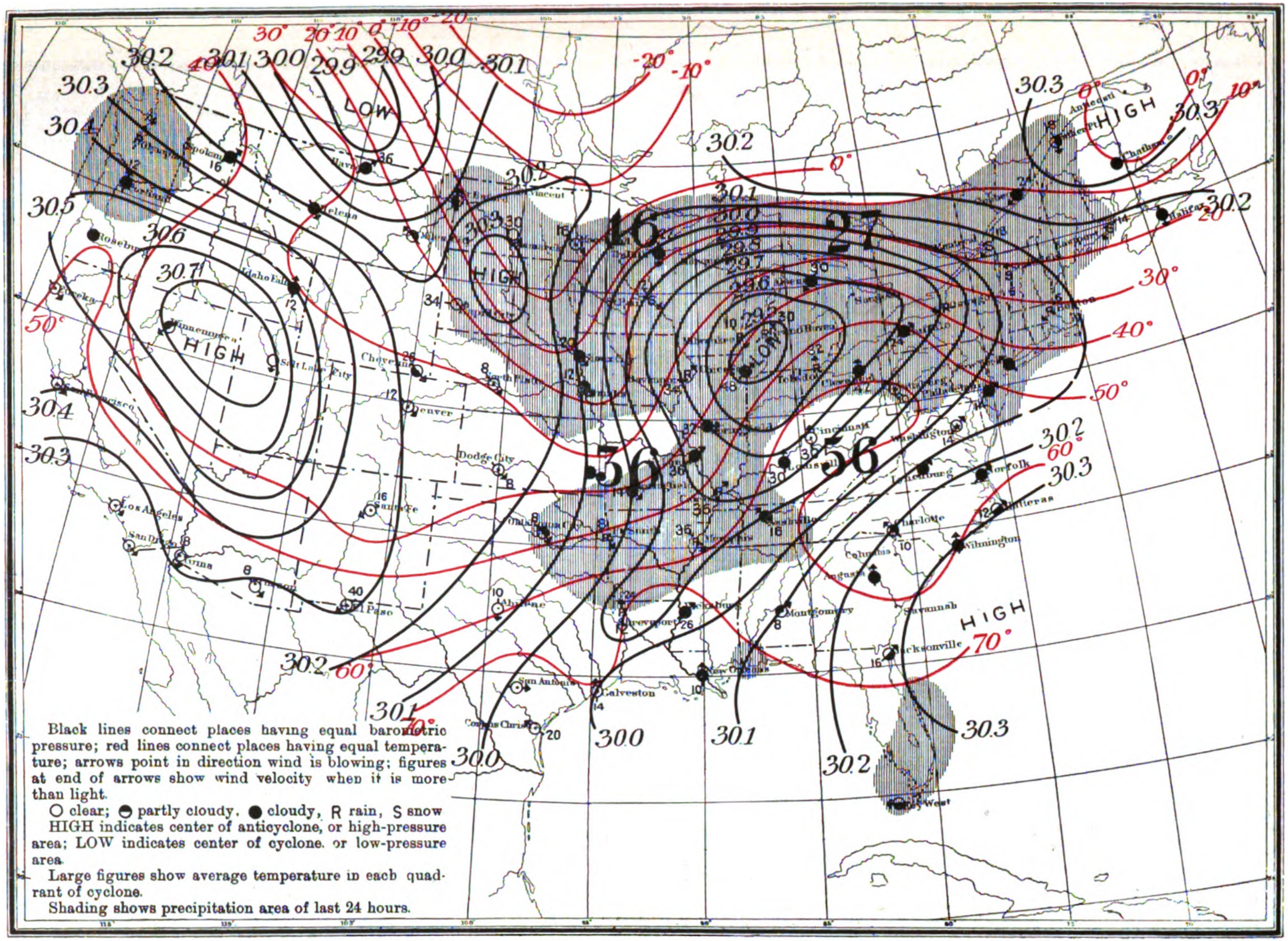

30.3
30.4
30.5
30.6
HIGH
30.3
HIGH
30.2
30.0
29.9
29.8
29.7
29.6
LOW
17
35
50
58
30.3
HIGH
30.4
30.3
30.4
HIGH
30.4
30.3
30.2
30.1
30.1
30.2
Rapid City
Cheyenne
Denver
Dodge City
Salt Lake City
El Paso
Los Angeles
San Francisco
Eureka
Roseburg
Olympia
Idaho Falls
Helena
Havre
Bismarck
St. Paul
Chicago
Davenport
Toledo
Cleveland
Buffalo
Oswego
Boston
Philadelphia
Norfolk
Hatteras
Wilmington
Charlotte
Augusta
Savannah
Jacksonville
Key West
Montgomery
New Orleans
Galveston
San Antonio
Corpus Christi
Abilene
Fort Smith
Memphis
Cincinnati
Louisville
Springfield
St. Louis
Lynchburg
Washington
Pittsburg
Marquette
Duluth
Milwaukee
Grand Haven
Sioux City
Omaha
North Platte
Yuma
Tucson
Santa Fe
Oklahoma City
Shreveport
Vicksburg
Halifax
Eastport
Montreal
Quebec
Father Pt.
Anticosti

Black lines connect places having equal barometric pressure; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◐ partly cloudy; ● cloudy; R rain; S snow. HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

CHART I.—Winter Storm, December 15, 1893, 8 A. M.


HIGH
LOW
HIGH
LOW
HIGH
HIGH
46
27
56
56
30.3
30.4
30.5
30.6
30.7
30.2
30.1
30.0
29.9
29.9
30.0
30.1
30.2
30.3
30.2
30.3
30.0
30.1
30.2
30.3
30°
20°
10°
0°
-10°
-20°
-20°
-10°
0°
10°
30°
40°
50°
60°
70°
50°
60°
70°
Spokane
Helena
Havre
Idaho Falls
Winnemucca
Salt Lake City
Cheyenne
Denver
North Platte
Dodge City
Santa Fe
El Paso
Los Angeles
San Diego
Yuma
San Francisco
Roseburg
Eureka
Abilene
San Antonio
Galveston
Corpus Christi
Shreveport
Vicksburg
New Orleans
Montgomery
Nashville
Louisville
Cincinnati
Washington
Lynchburg
Norfolk
Hatteras
Charlotte
Wilmington
Columbia
Augusta
Savannah
Jacksonville
Key West
Halifax
Chatham
Anticosti
St. Vincent

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity when it is more than light.

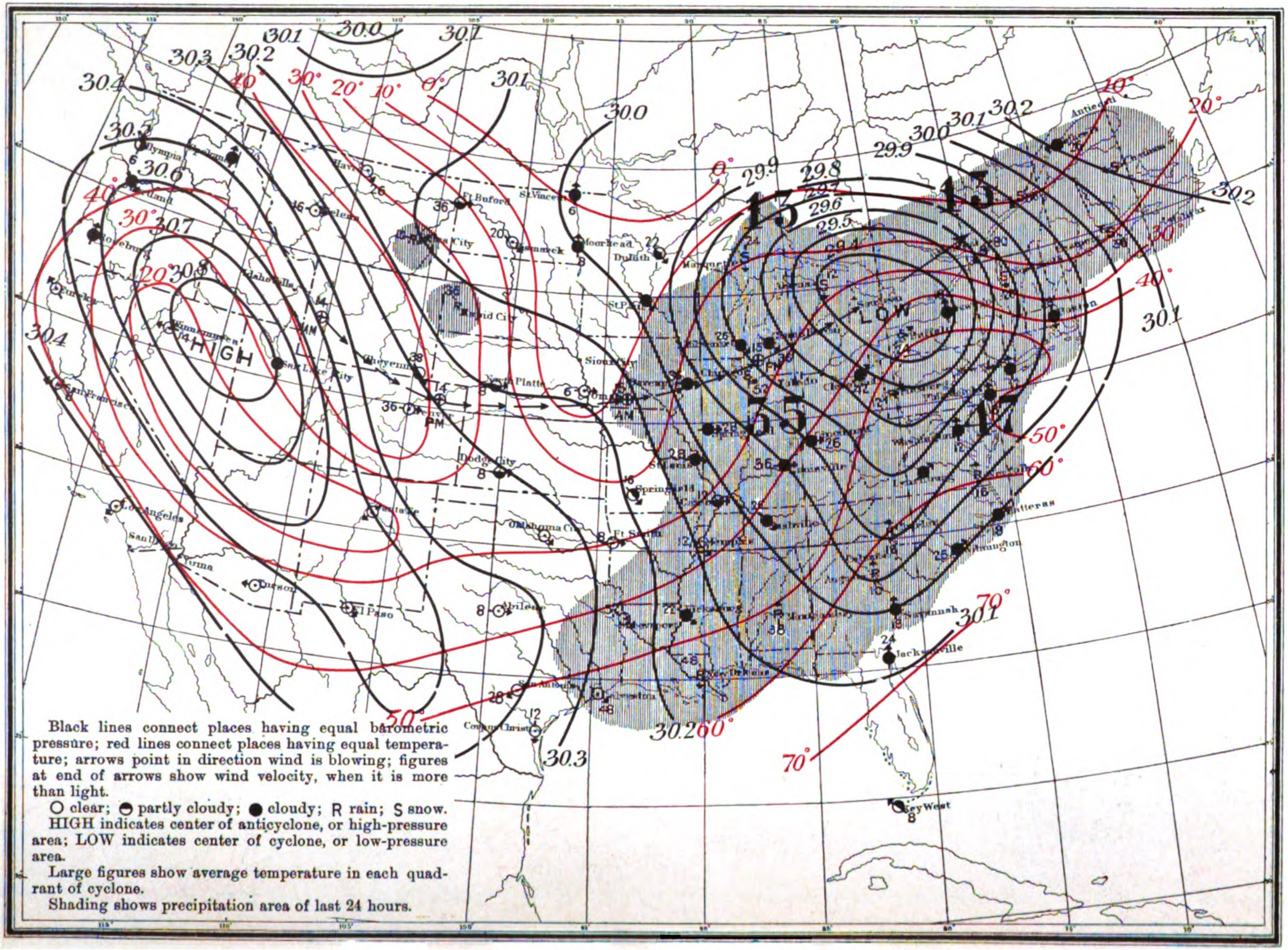
○ clear; ◓ partly cloudy, ● cloudy, R rain, S snow

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.

CHART II.—Winter Storm, December 15, 1893, 8 P. M.


30.4
30.3
30.2
30.1
30.0
30.1
30.1
30.0
29.9
29.8
29.7
29.6
29.5
29.4
30.0
30.1
30.2
30.2
30.1
30.1
30.2
30.3
30.4
30.5
30.6
30.7
30.8
40°
30°
20°
10°
0°
0°
10°
20°
30°
40°
50°
60°
70°
70°
50°
HIGH
LOW
15
13
55
47
Olympia
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
El Paso
Winnemucca
Salt Lake City
Cheyenne
Helena
Havre
Miles City
Rapid City
Ft Buford
Bismarck
St Vincent
Moorhead
Duluth
Marquette
St Paul
Sioux City
Omaha
North Platte
Dodge City
Oklahoma City
Ft Smith
Abilene
San Antonio
Corpus Christi
Galveston
New Orleans
Springfield
Memphis
Savannah
Jacksonville
Key West
Hatteras
Wilmington
Boston
Antiecti
AM
PM

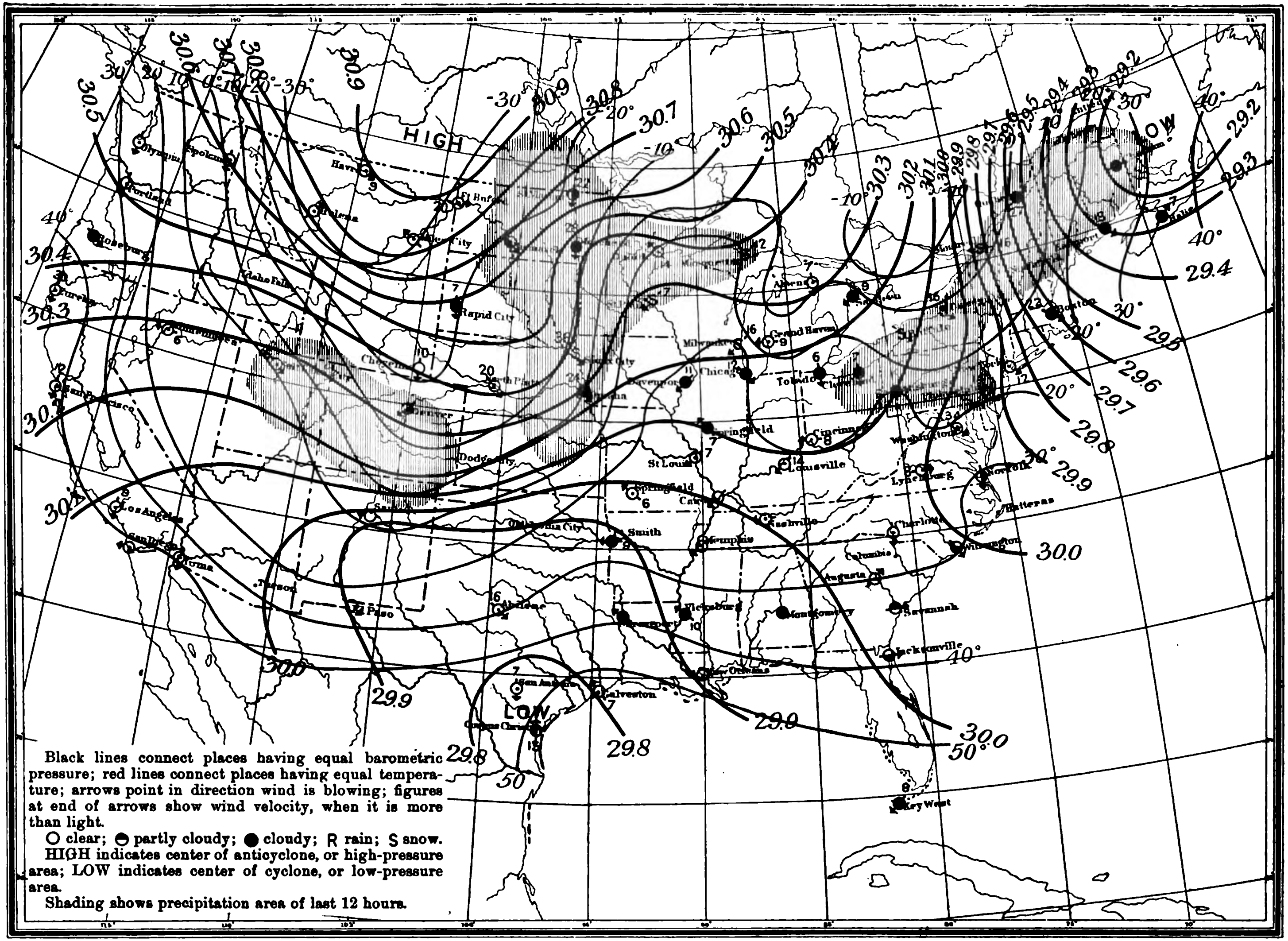
Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow. HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.

CHART III.— Winter Storm, December 16, 1893, 8 A. M.


HIGH
LOW
LOW
30.9
30.8
30.7
30.6
30.5
30.4
30.3
30.2
30.1
30.0
29.9
29.8
29.7
29.6
29.5
29.4
29.3
29.2
-30°
-10°
20°
30°
40°
50°
Olympia
Portland
Spokane
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Helena
Havre
Idaho Falls
Rapid City
Cheyenne
Denver
Dodge City
North Platte
Omaha
Davenport
Chicago
Milwaukee
Grand Haven
Alpena
Toledo
Springfield
St Louis
Cincinnati
Louisville
Washington
Lynchburg
Norfolk
Hatteras
Wilmington
Charlotte
Columbia
Augusta
Savannah
Jacksonville
Key West
Nashville
Cairo
Memphis
Springfield
Fort Smith
Oklahoma City
Vicksburg
Montgomery
Shreveport
New Orleans
Abilene
El Paso
Tucson
San Antonio
Corpus Christi
Galveston
Boston
New York

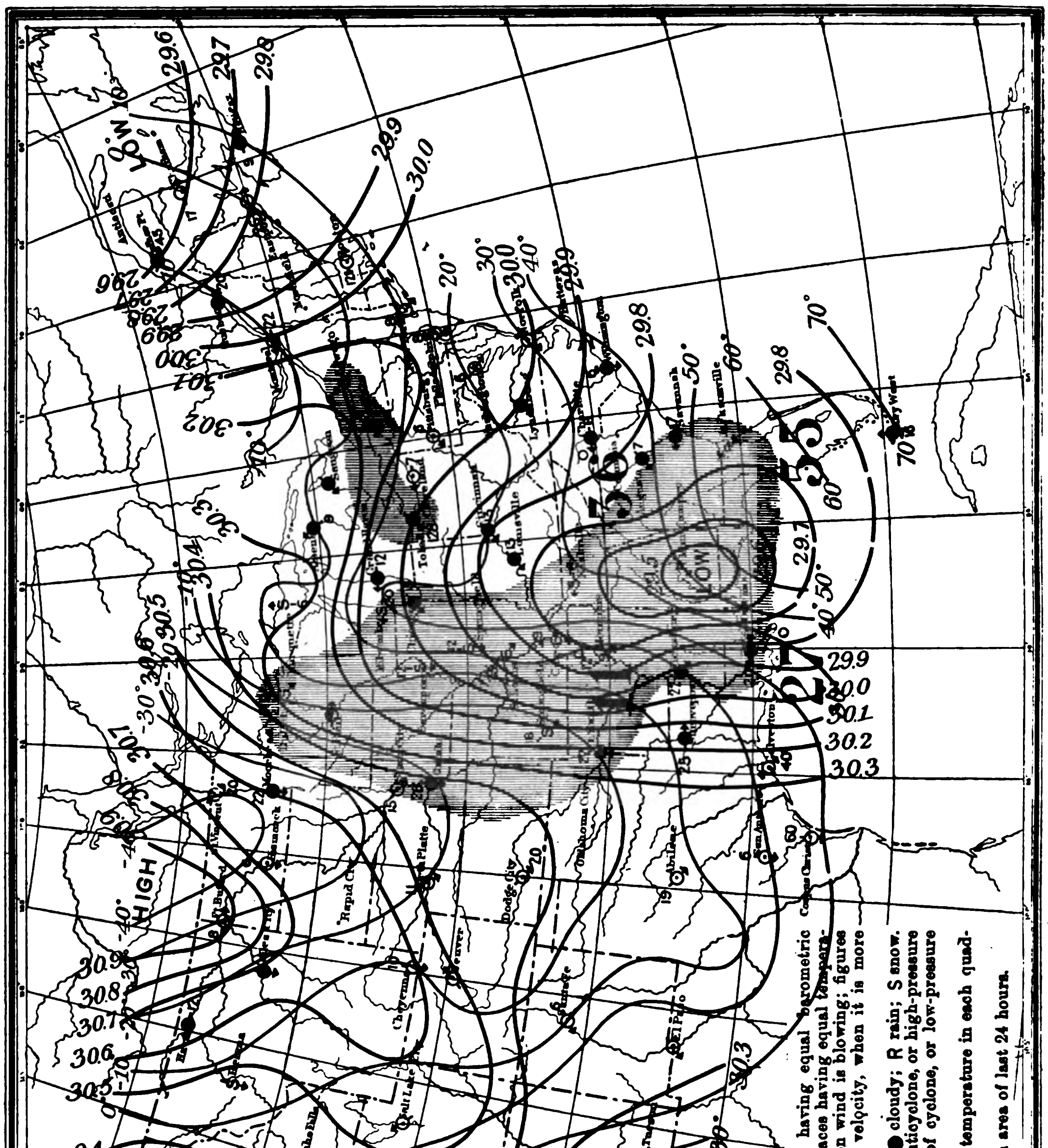
Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART IV.—Cold Wave, January 7, 1886, 7 A. M.


HIGH
LOW
LOW
29.6
29.7
29.8
29.9
30.0
30.1
30.2
30.3
30.4
30.5
30.6
30.7
30.8
30.9
Denver
Cheyenne
Salt Lake
North Platte
Rapid City
Dodge City
El Paso
Los Angeles
San Diego
Spokane
Olympia
Key West
Jacksonville
Savannah

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

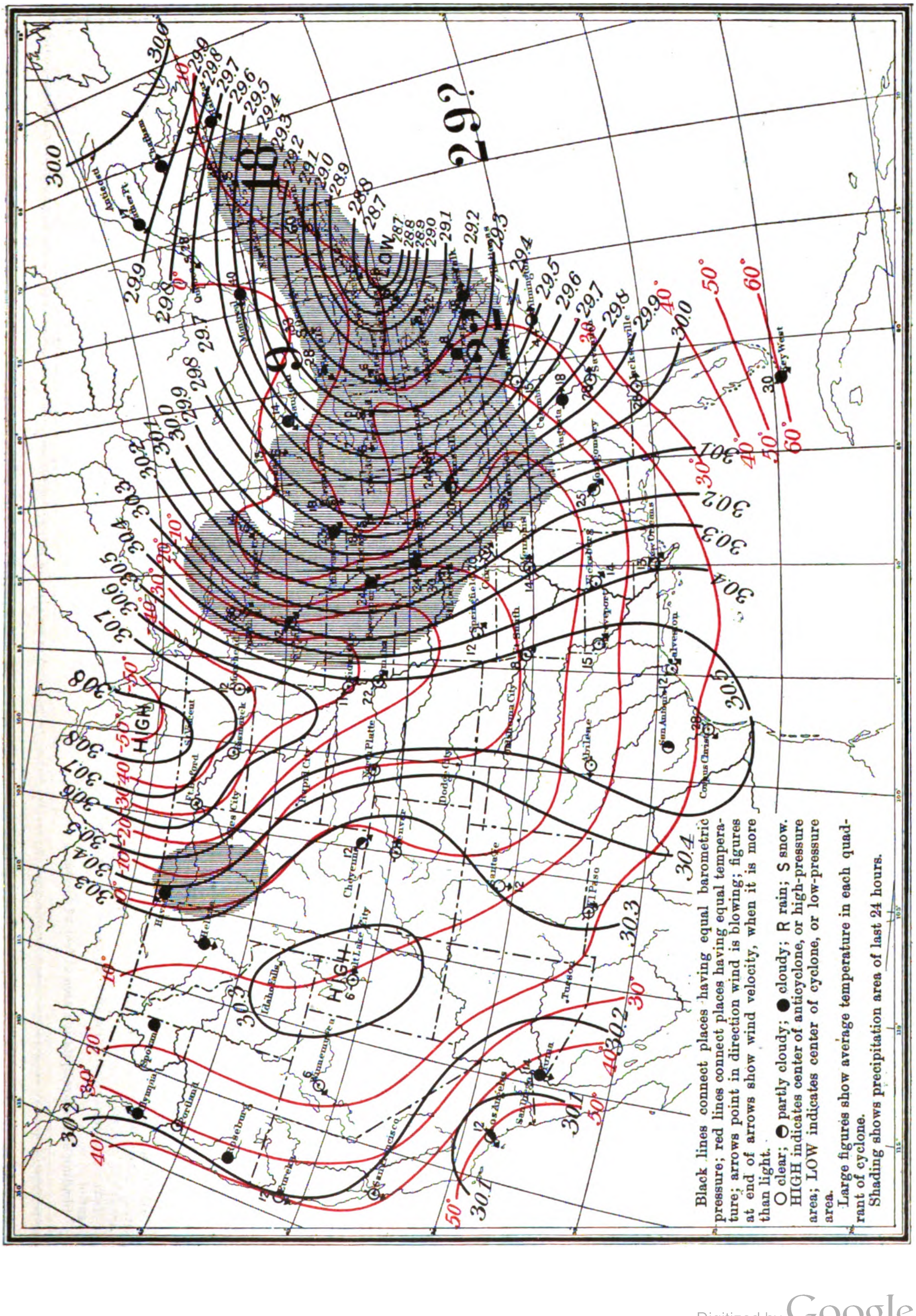
○ clear; ◐ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.

CHART V.—Cold Wave, January 8, 1886, 7 A. M.


HIGH
HIGH
LOW
29?
18
9
30.0
29.9
29.8
29.7
29.6
29.5
29.4
29.3
29.2
29.1
29.0
28.9
28.8
28.7
30.1
30.2
30.3
30.4
30.5
30.6
30.7
30.8
0°
10°
20°
30°
40°
50°
60°
Salt Lake City
Cheyenne
Denver
North Platte
Dodge City
El Paso
San Antonio
Galveston
New Orleans
Key West
San Francisco
Los Angeles
Portland
Olympia
Spokane

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

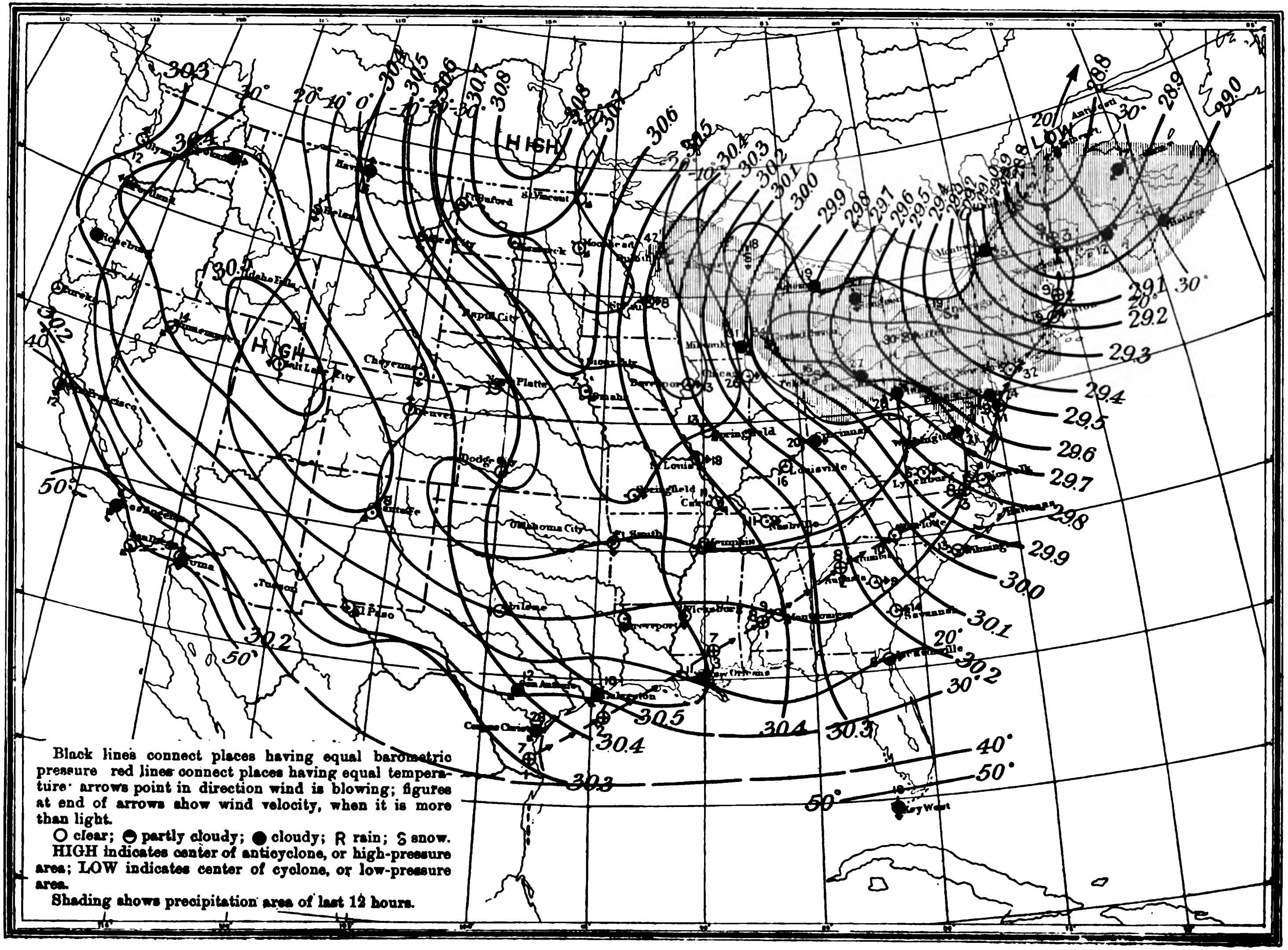
○ clear; ◐ partly cloudy; ● cloudy; R rain; S snow.

HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 24 hours.

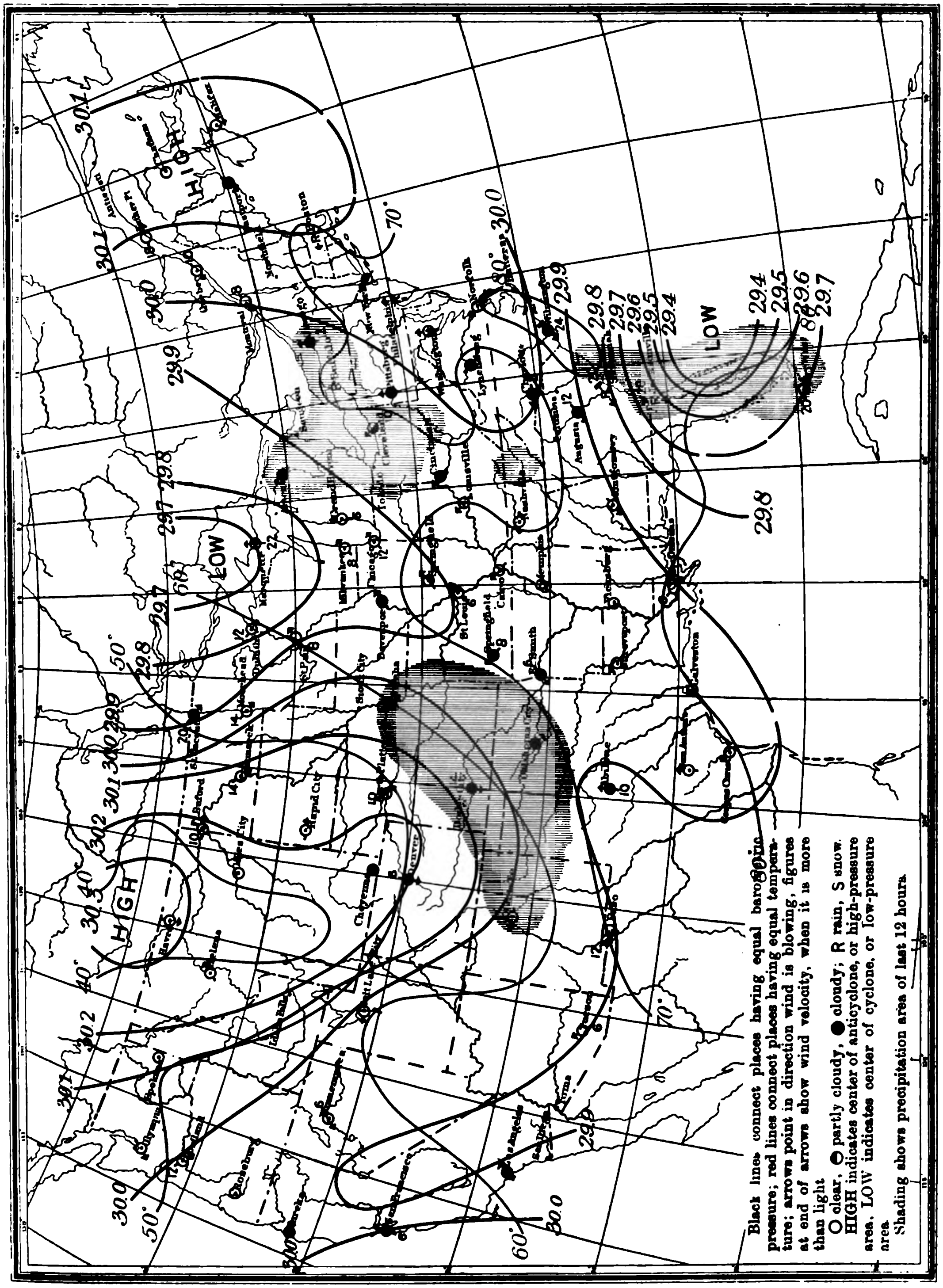
CHART VI.—Cold Wave, January 9, 1886, 7 A.M.


HIGH
HIGH
LOW
30.3
30.4
30.5
30.6
30.7
30.8
30.2
29.0
28.9
28.8
29.1
29.2
29.3
29.4
29.5
29.6
29.7
29.8
29.9
30.0
30.1
30°
20°
10°
0°
-10°
40°
50°
Key West
New Orleans
Galveston
San Antonio
Memphis
Nashville
Louisville
Cincinnati
Washington
Norfolk
Lynchburg
Savannah
Jacksonville
St Louis
Springfield
Chicago
Milwaukee
Davenport
Omaha
North Platte
Cheyenne
Denver
Dodge City
Santa Fe
El Paso
Abilene
Fort Smith
Oklahoma City
Shreveport
Vicksburg
Montgomery
Yuma
Los Angeles
San Diego
San Francisco
Roseburg
Eureka
Salt Lake City
Idaho Falls
Helena
Ft Buford
St Vincent
Bismarck
Moorhead
Rapid City
Tucson
Corpus Christi
Montreal
Boston

Black lines connect places having equal barometric pressure red lines connect places having equal temperature· arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow.
HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.
Shading shows precipitation area of last 12 hours.

CHART VII.—Cold Wave, January 10, 1886, 7 A. M.

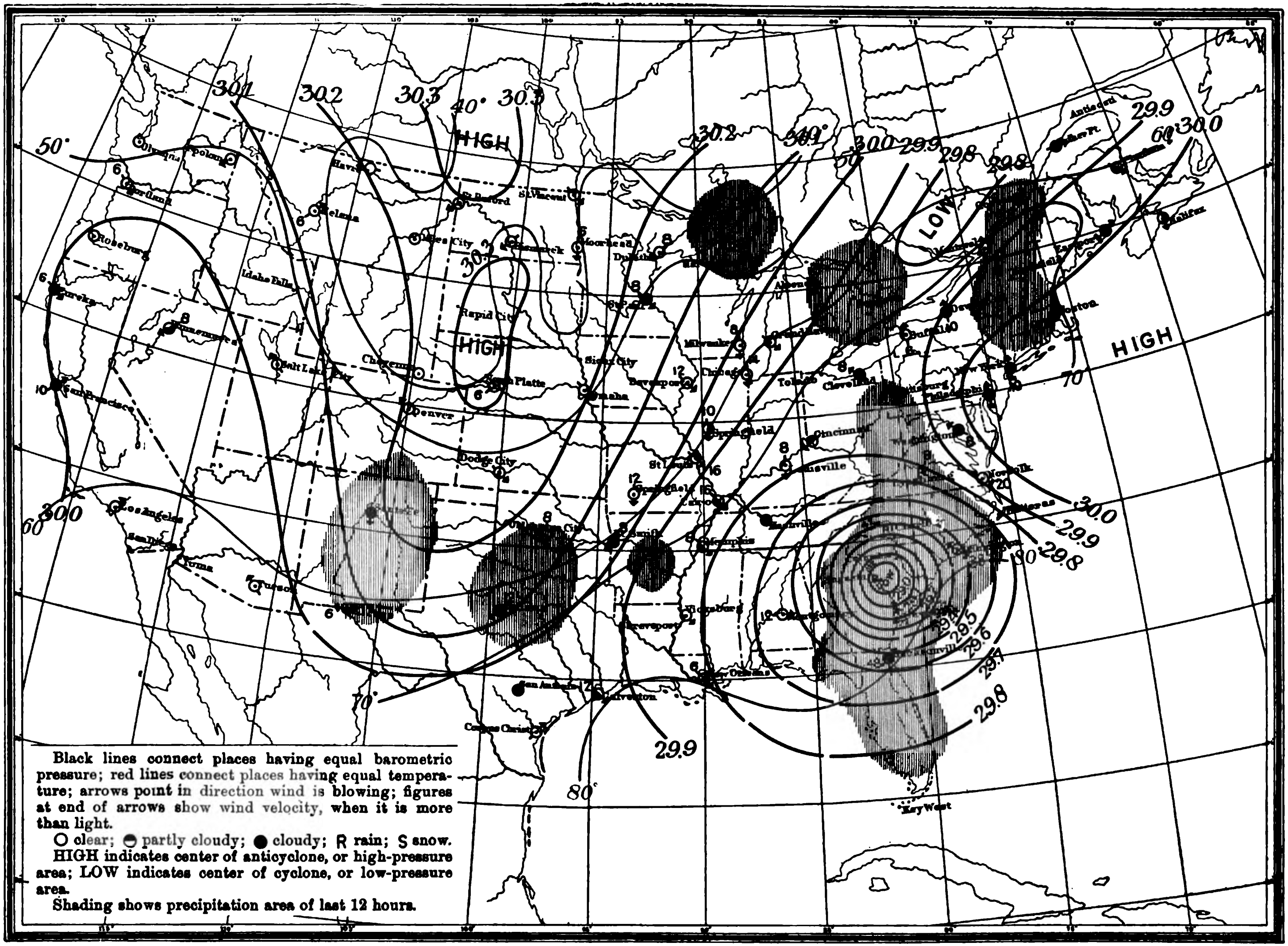

HIGH
HIGH
LOW
LOW
30.1
30.0
29.9
29.8
29.7
29.6
29.5
29.4
30.2
30.3
30.4
50°
60°
70°
80°
40°
Denver
Cheyenne
Galveston
St. Louis
Cincinnati
Montreal
Boston
Norfolk
Augusta
Salt Lake City
Rapid City
Spokane
Olympia
Havre
Helena
Eureka
San Francisco
Los Angeles
Yuma
El Paso
San Antonio
Abilene
Memphis
Shreveport
Nashville
Lynchburg
Hatteras
Wilmington
Savannah
Jacksonville
Montgomery
Vicksburg
Davenport
Dubuque
Duluth
Chicago
Milwaukee
Toledo
Omaha
Sioux City
Huron
Moorhead
St. Paul
Bismarck
Buford
Fort Smith
Springfield
Cairo
Indianapolis
Pittsburg
New York
Albany
Eastport
Halifax
Northfield
Oswego
Buffalo
Detroit
Marquette
Alpena
Sault Ste. Marie

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing, figures at end of arrows show wind velocity, when it is more than light

O clear, ◐ partly cloudy, ● cloudy; R rain, S snow. HIGH indicates center of anticyclone, or high-pressure area. LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART VIII.—West Indian Hurricane, August 27, 1893, 8 A. M.

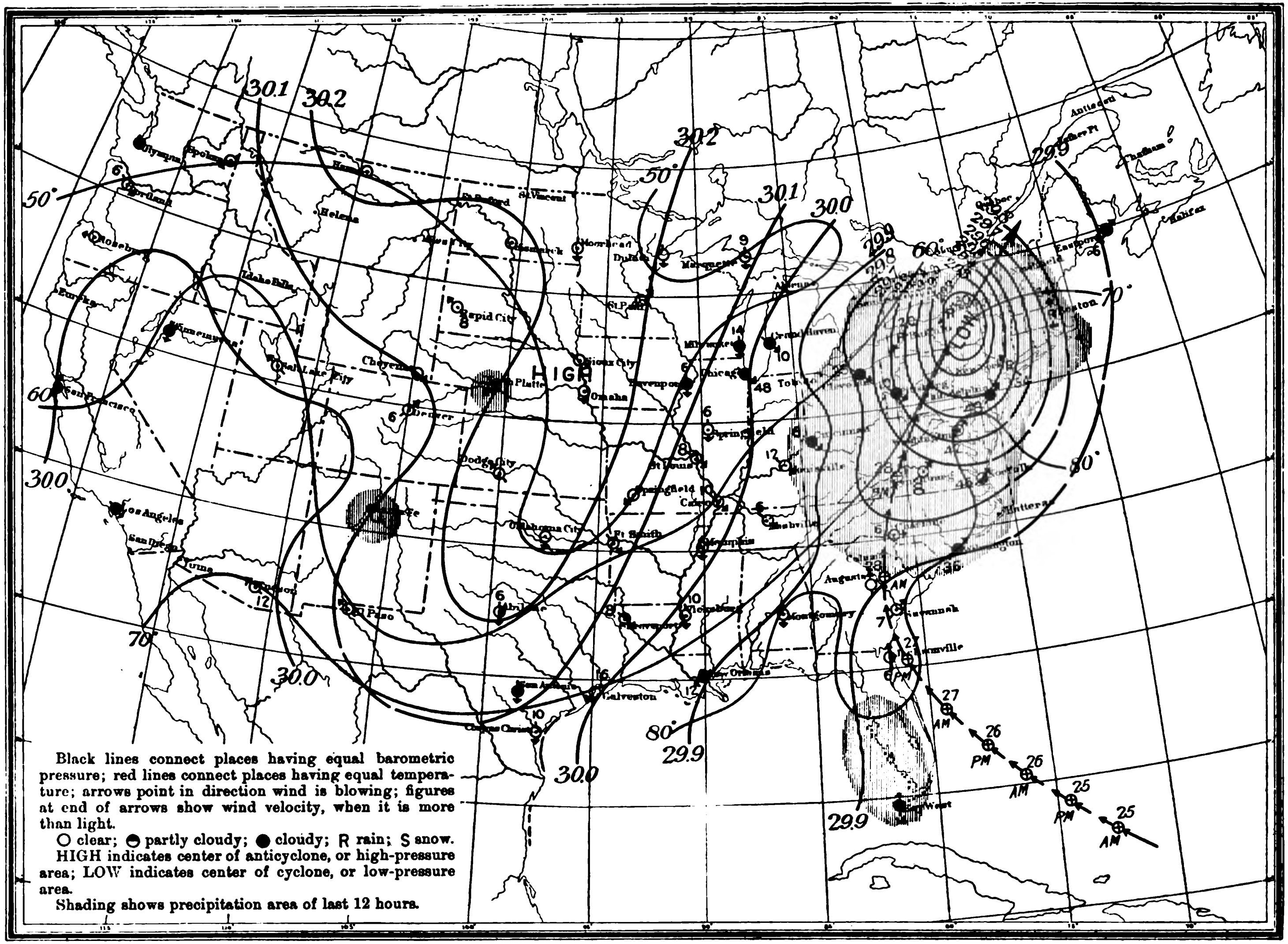

HIGH
HIGH
HIGH
LOW
30.1
30.2
30.3
30.3
30.2
30.1
30.0
29.9
29.8
29.8
29.9
30.0
29.9
29.8
29.7
29.6
29.5
29.8
29.9
30.0
40°
50°
60°
70°
80°
Boston
Buffalo
Cleveland
Toledo
Chicago
Milwaukee
Duluth
Moorhead
Bismarck
Miles City
Helena
Havre
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
Salt Lake City
Cheyenne
Denver
Rapid City
North Platte
Omaha
Sioux City
Davenport
Springfield
St Louis
Cincinnati
Nashville
Memphis
Vicksburg
Shreveport
New Orleans
Galveston
San Antonio
Corpus Christi
Dodge City
Norfolk
Key West
Halifax
Anticosti
Pittsburg
Philadelphia
New York
Savannah
Jacksonville
Montgomery
Hatteras

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◐ partly cloudy; ● cloudy; R rain; S snow.
HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART IX.—West Indian Hurricane, August 28, 1893, 8 A. M.


30.1
30.2
30.2
30.1
30.0
29.9
29.9
29.9
30.0
30.0
30.0
50°
50°
60°
60°
70°
70°
80°
80°
HIGH
LOW
Olympia
Spokane
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Helena
Idaho Falls
Salt Lake City
Cheyenne
Denver
Rapid City
N. Platte
Dodge City
Bismarck
Moorhead
Duluth
St. Paul
Sioux City
Omaha
Marquette
Milwaukee
Chicago
Davenport
Springfield
St. Louis
Cairo
Oklahoma City
Ft. Smith
Memphis
Nashville
Abilene
El Paso
Galveston
New Orleans
Montgomery
Augusta
Savannah
Jacksonville
Key West
Boston
Eastport
Halifax
Hatteras
Corpus Christi
San Antonio
27 AM
26 PM
26 AM
25 PM
25 AM

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

○ clear; ◒ partly cloudy; ● cloudy; R rain; S snow. HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Shading shows precipitation area of last 12 hours.

CHART X.—West Indian Hurricane, August 29, 1893, 8 A. M.

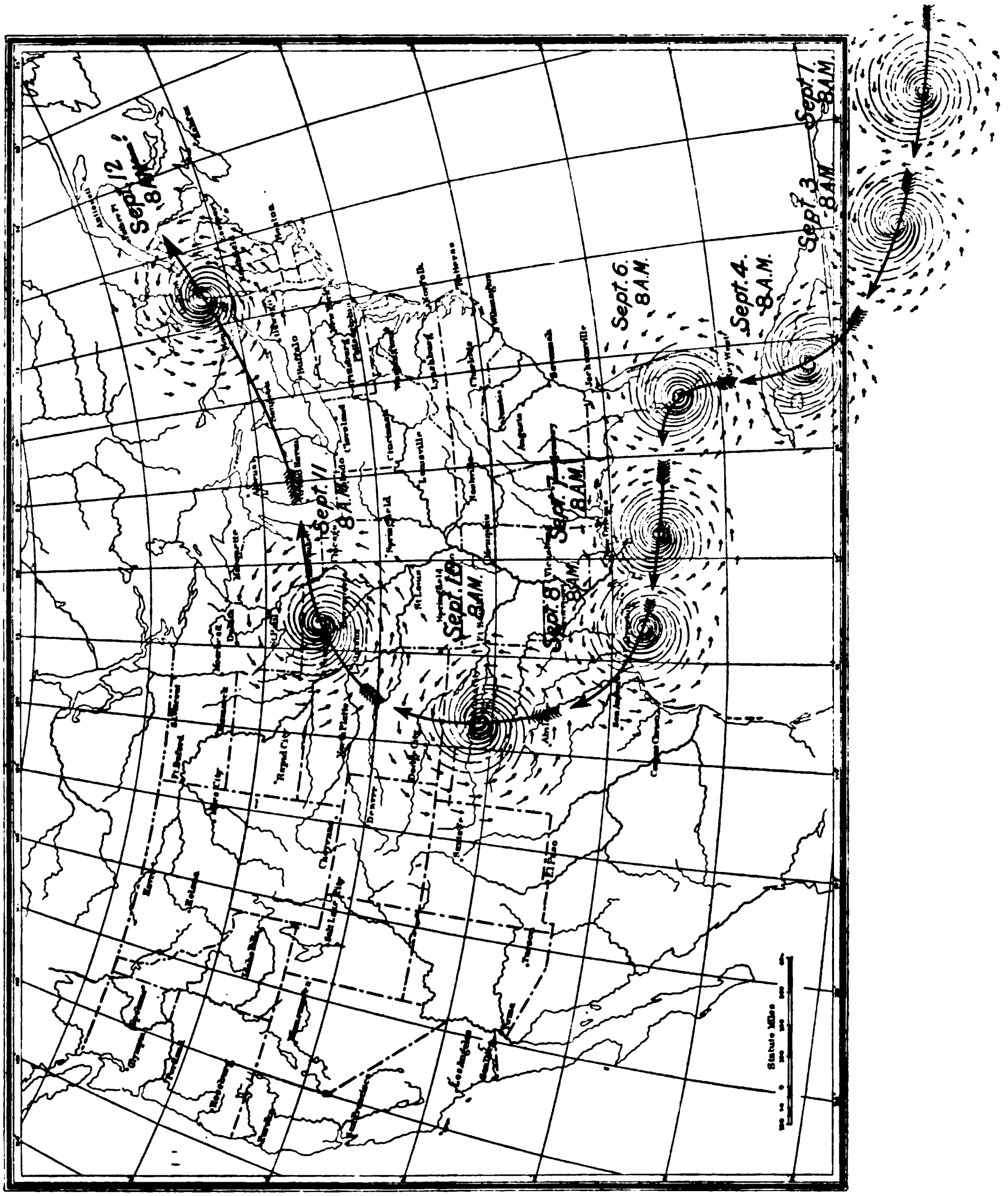

Sept. 1. 8 A.M.
Sept. 3 8 A.M.
Sept. 4. 8 A.M.
Sept. 6. 8 A.M.
Sept. 7. 8 A.M.
Sept. 8 8 A.M.
Sept. 10 8 A.M.
Sept. 11 8 A.M.
Sept. 12 8 A.M.
Statute Miles

CHART XI.—The Galveston Hurricane, 1900

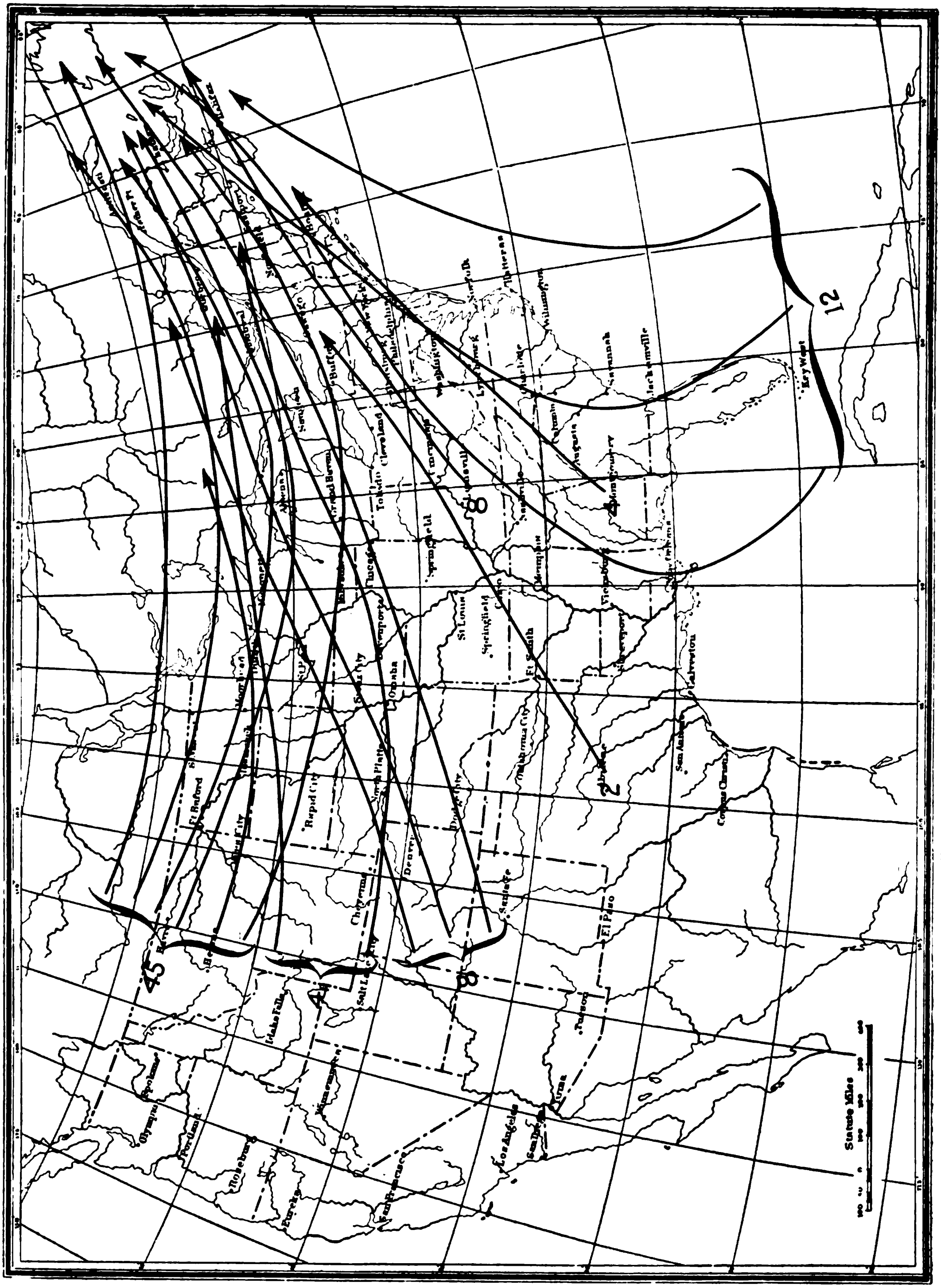

12
8
4
2
45
8
4
Key West
Jacksonville
Savannah
Wilmington
Norfolk
Hatteras
Washington
Philadelphia
Lynchburg
Charlotte
Augusta
Montgomery
Vicksburg
Memphis
Nashville
Shreveport
Galveston
San Antonio
Corpus Christi
Ft Smith
Oklahoma City
St Louis
Springfield
Cairo
Chicago
Davenport
Omaha
Dodge City
Denver
North Platte
Rapid City
Cheyenne
Santa Fe
El Paso
Salt Lake City
Idaho Falls
Helena
Ft Buford
Winnemucca
Spokane
Olympia
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
Buffalo
Cleveland
Toledo
Grand Haven
Alpena
Montreal
Halifax
Statute Miles

CHART XII.—Storm Tracks for August

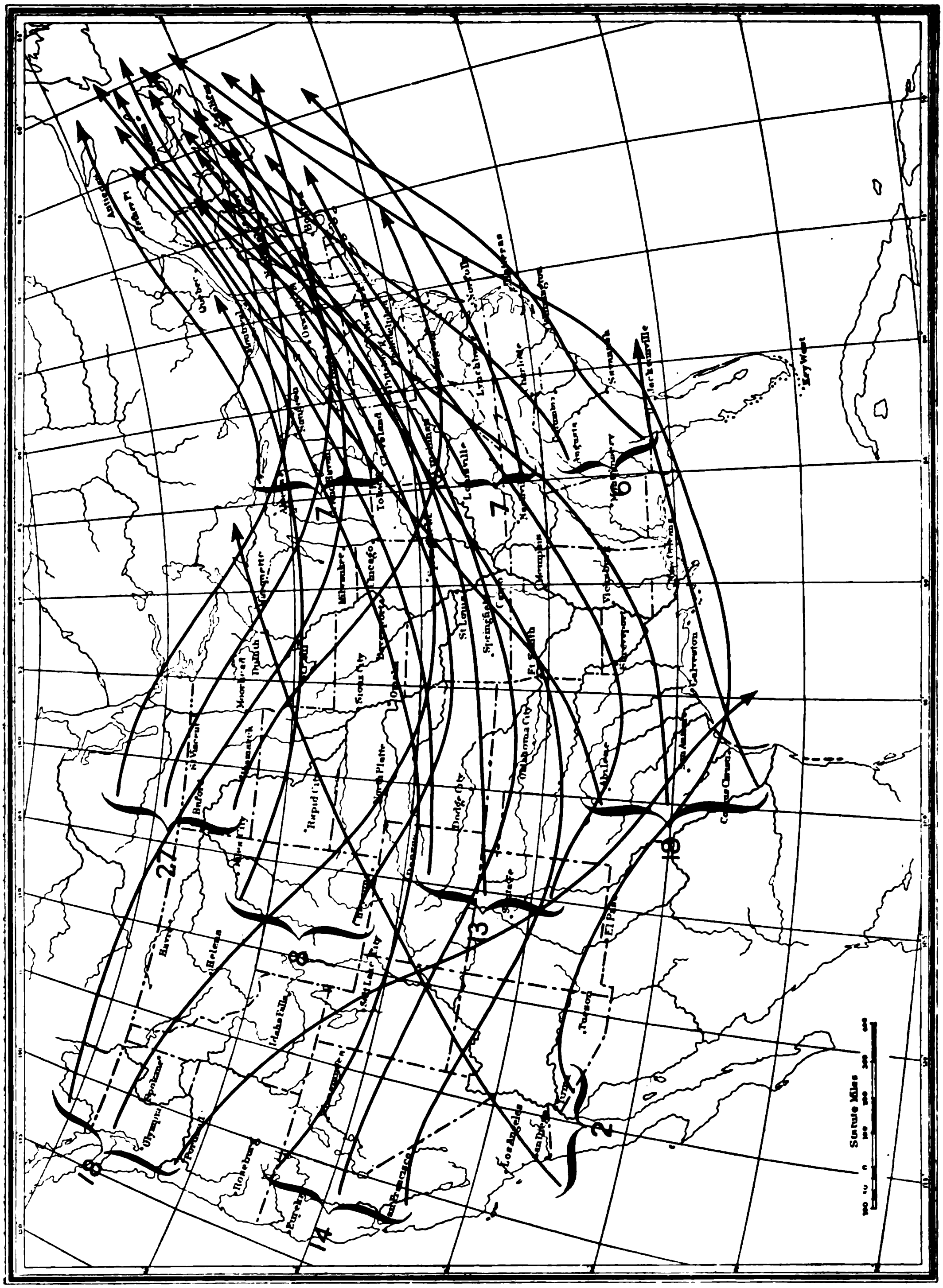

Quebec
Montreal
Buffalo
Cleveland
Toledo
Milwaukee
Chicago
Duluth
Moorhead
Bismarck
Sioux City
Omaha
North Platte
Rapid City
St Louis
Springfield
Memphis
Ft Smith
Oklahoma City
Dodge City
Lynchburg
Charlotte
Augusta
Savannah
Jacksonville
Key West
Montgomery
Vicksburg
Shreveport
New Orleans
Galveston
San Antonio
Corpus Christi
Abilene
El Paso
Tucson
Salt Lake City
Idaho Falls
Havre
Helena
Spokane
Olympia
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Statute Miles
27
18
14
8
4
3
2
7
7
6
18

CHART XIII.—Storm Tracks for February

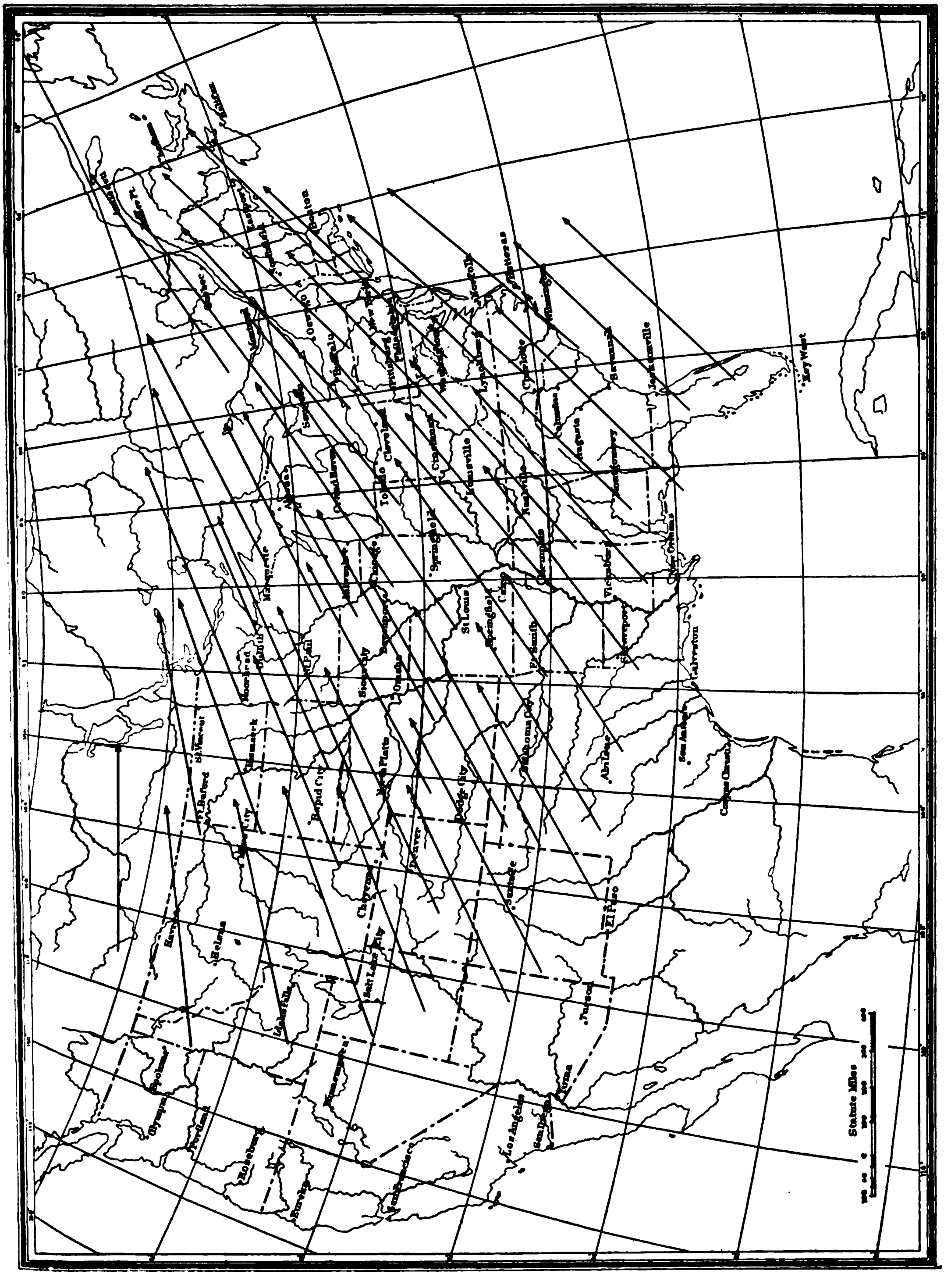
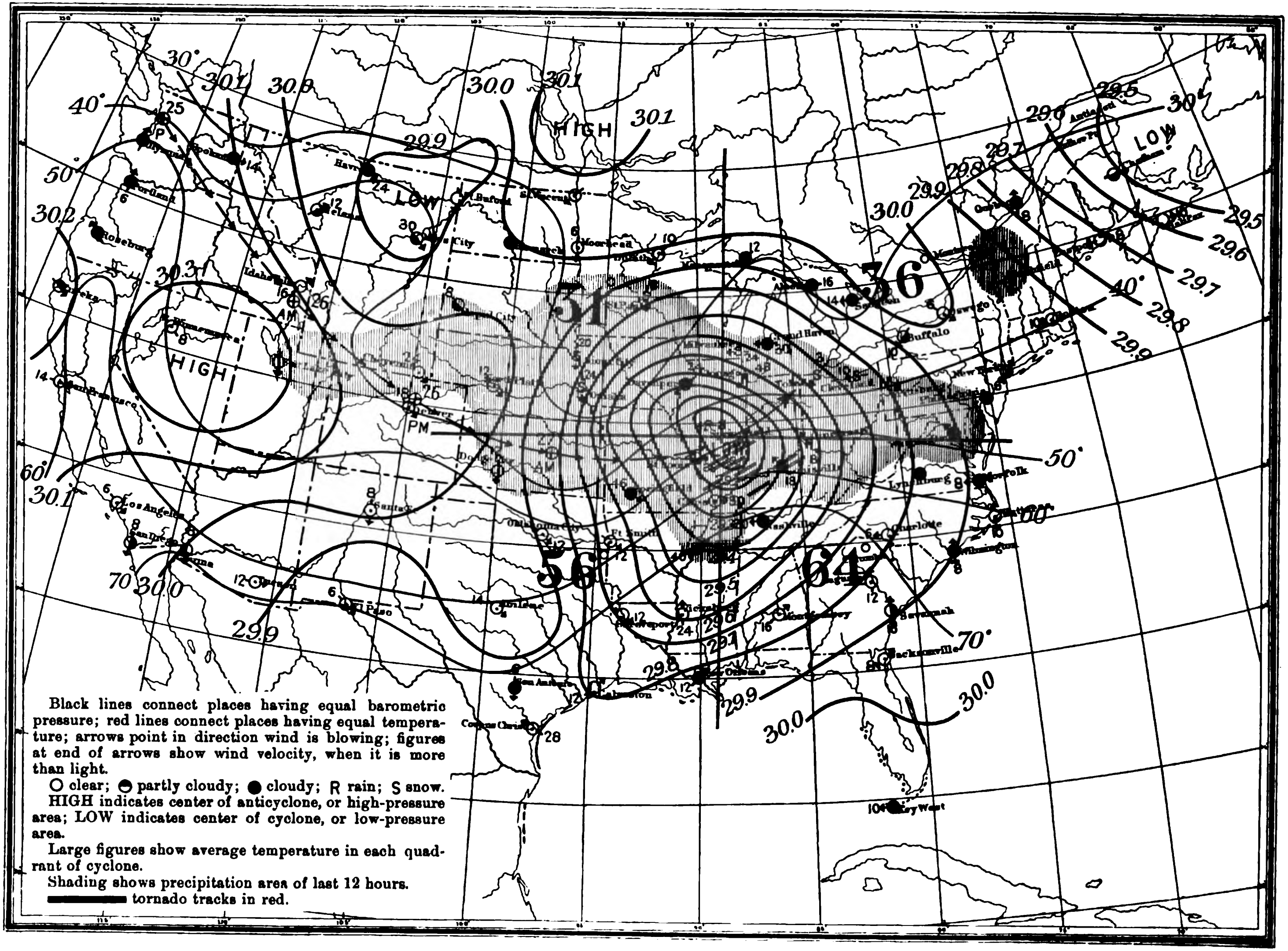

Boston
Eastport
Northfield
New York
Oswego
Buffalo
Pittsburg
Norfolk
Hatteras
Wilmington
Charlotte
Lynchburg
Savannah
Jacksonville
Key West
Montgomery
Atlanta
Knoxville
Nashville
Cincinnati
Cleveland
Toledo
Detroit
Grand Haven
Alpena
Marquette
Milwaukee
Chicago
Springfield
St Louis
Memphis
Vicksburg
New Orleans
Shreveport
Galveston
San Antonio
Corpus Christi
Abilene
Oklahoma City
Ft. Smith
Springfield
Cairo
Davenport
Sioux City
Omaha
St. Paul
Moorhead
Duluth
Bismarck
St. Vincent
Ft. Buford
Miles City
Rapid City
North Platte
Dodge City
Denver
Santa Fe
El Paso
Cheyenne
Salt Lake City
Helena
Havre
Idaho Falls
Spokane
Olympia
Portland
Roseburg
Eureka
Winnemucca
San Francisco
Los Angeles
San Diego
Yuma
Phoenix
Statute Miles

CHART XVII.—Normal Storm Tracts for May


HIGH
HIGH
LOW
LOW
30.0
30.1
29.9
30.2
30.3
29.5
29.6
29.7
29.8
40°
50°
60°
70°
30°
36
51
56
64
AM
PM
Buffalo
Oswego
Spokane
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
El Paso
Santa Fe
Abilene
Ft. Smith
Oklahoma City
Nashville
Charlotte
Lynchburg
Norfolk
Wilmington
Savannah
Jacksonville
Key West
New Orleans
Galveston
Corpus Christi
San Antonio
Shreveport
Montgomery
Grand Haven
Havre
Moorhead

Black lines connect places having equal barometric pressure; red lines connect places having equal temperature; arrows point in direction wind is blowing; figures at end of arrows show wind velocity, when it is more than light.

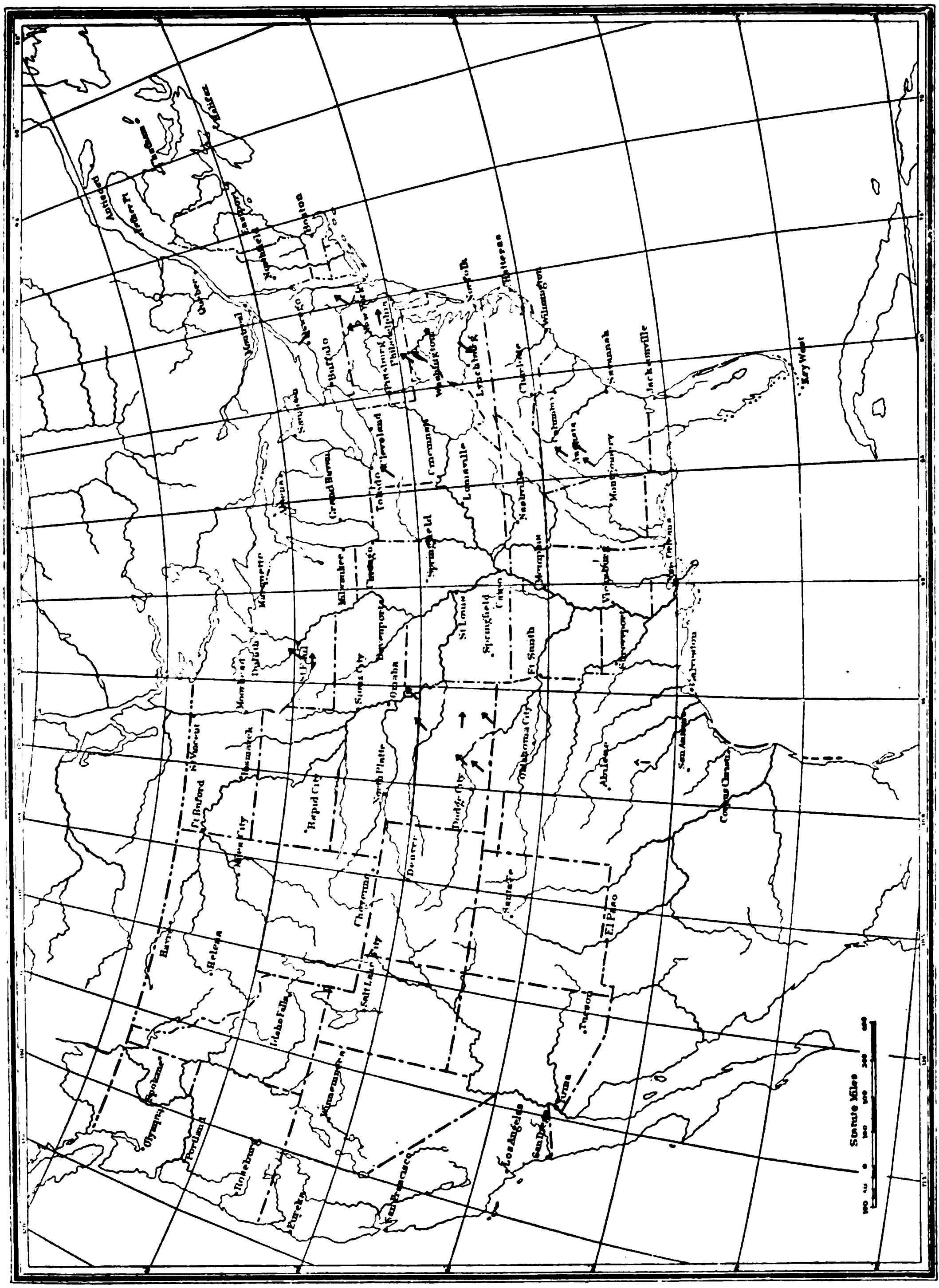
○ clear; ◓ partly cloudy; ● cloudy; R rain; S snow. HIGH indicates center of anticyclone, or high-pressure area; LOW indicates center of cyclone, or low-pressure area.

Large figures show average temperature in each quadrant of cyclone.

Shading shows precipitation area of last 12 hours.

▬ tornado tracks in red.

CHART XVIII.—Tornado at Louisville, Ky., March 27, 1890. Weather Map 8 P. M. of that date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Atlanta
Montgomery
Cleveland
Toledo
Cincinnati
Louisville
Nashville
Chattanooga
Grand Haven
Chicago
Milwaukee
Springfield
St Louis
Memphis
Vicksburg
New Orleans
Shreveport
Galveston
Cairo
Ft Smith
Davenport
Sioux City
Omaha
St Paul
Duluth
Marquette
Moorhead
Bismarck
Ft Buford
St Vincent
Miles City
Rapid City
North Platte
Dodge City
Oklahoma City
Abilene
San Antonio
Corpus Christi
Denver
Cheyenne
Santa Fe
El Paso
Tucson
Yuma
Salt Lake City
Helena
Havre
Idaho Falls
Spokane
Olympia
Portland
Roseburg
Eureka
Winnemucca
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San Diego
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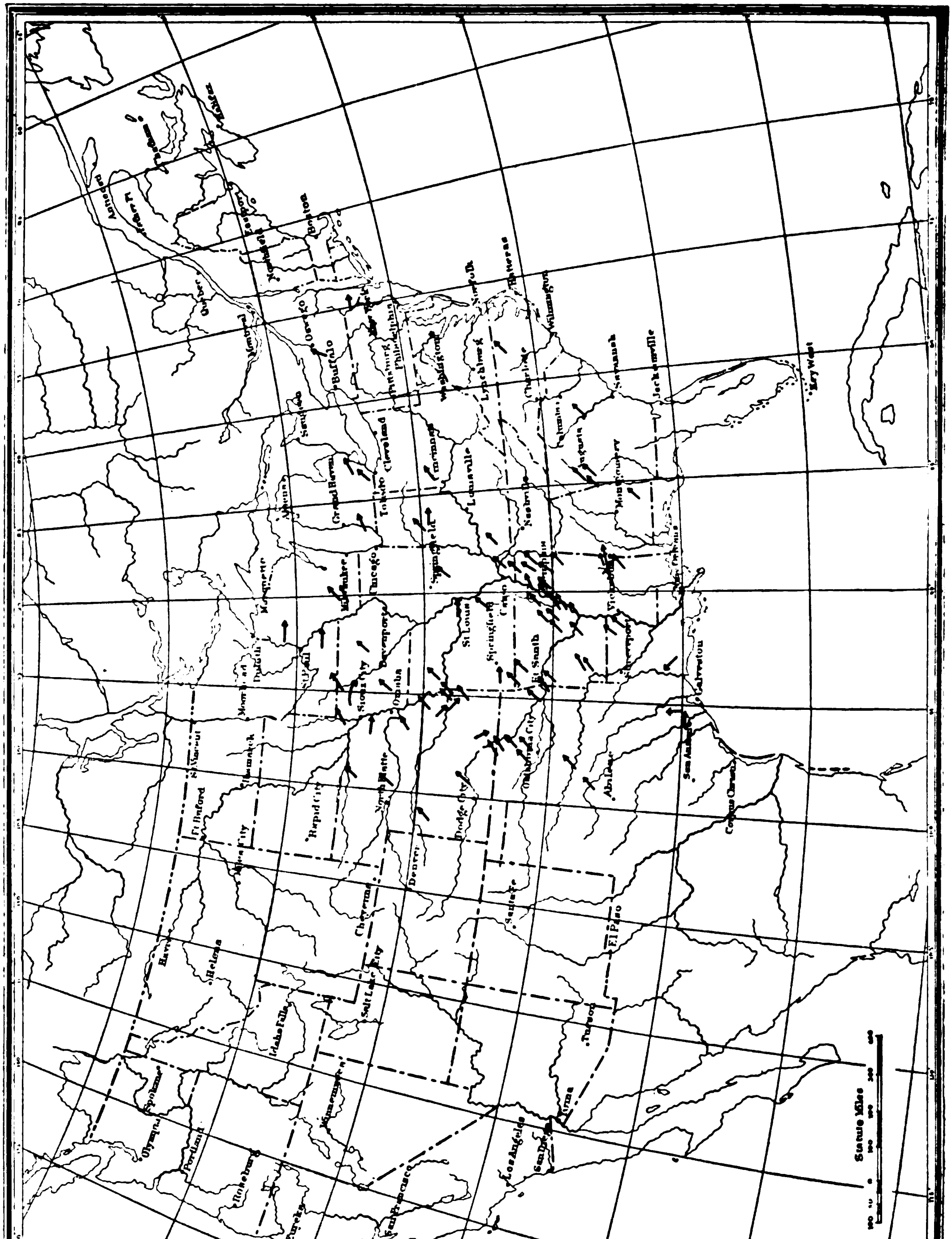
300
400

CHART XIX.—Tornadoes of 1889—a year of small frequency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Salt Lake City
Idaho Falls
Winnemucca
Spokane
Olympia
Portland
Roseburg
Eureka
San Francisco
Los Angeles
San Diego
Yuma
Tucson
Statute Miles

CHART XX.—Tornadoes of 1893—a year of great frequency bors of safety. It is pertinent here to ask the student of weather forecasting what would have been the direction of the wind and its effect on the coast line if the storm had followed the usual course and passed northeastward with its center over the water instead of over the land. By this time the reader should be able to answer: The winds would have been from the west and much less harmful to mariners, because the surface water would have been driven seaward instead of being banked up in boisterous billows upon the shore, and ships would have scudded out to ocean before the gale instead of being broken up on the reefs.

West Indian hurricanes are cyclonic in character, but on account of the fact that the diameter of the whirling eddy is much less and the velocity of rotation much greater than in the average cyclone, it is customary to designate them as hurricanes. In other words, the hurricane is a cyclone of small area, but of powerful vortical action, and consequently of great destructive force.

Chart XI shows the track of the Galveston storm. The spirals are not true pictures of the storm; neither do they represent pressure lines, as other charts have done. They are used to illustrate more clearly than can be done in any other way the eddy-like motion of a cyclone and at the same time give the location of the hurricane on various dates.

In explaining the hurricane of October 27, 1903 (chart VIII), it was stated that the storm was deflected a little from its normal course by an anti-cyclone that rested over the ocean. A similar distribution of air pressure occurred on September 6, 1900, when the hurricane was over Florida, except that the anticyclone covered the whole region from the Mississippi River eastward to Bermuda and southward to the Gulf. The storm was therefore forced to travel westward around the high to the Texas coast before it could turn to the northeast. It was first detected in the Caribbean Sea. It then moved at the rate of only about eight miles an hour. It increased its speed between Florida and the Texas coast to about 12 miles. It did not become destructive until after it passed into the Gulf. Then its velocity of gyration became so great that the water was beaten into a fury and great swells were propagated outward in advance of the storm, some of which reached Galveston 16 hours before the hurricane. As the storm passed over the latter city the anemometer registered 100 miles per hour and then broke into pieces. This was probably nearly the highest velocity reached, as it occurred at about the time of lowest barometer, which was 28.48 inches. As the storm moved toward the Lakes its rate of translation increased to about 60 miles per hour, but its destructive force was much less on the land than on the water, although it produced wind velocities of over 70 miles at several Lake stations, which, by the way, were amply warned of the coming of the storm, as were all Gulf ports.

Between July and October, inclusive, there are annually about ten tropical storms that touch some portion of the Atlantic or Gulf coast. On an average, less than one per annum is severely destructive. Most of them are of such a nature that if timely warnings be issued, as they usually are, little loss of life or property occurs. As to the frequency with which these storms visit the Gulf, it may be said that the late Increase A. Lapham, of Wisconsin, carefully prepared a list of severe storms, more than thirty-five years ago, to be used by him as one of the arguments for a government weather service. He showed that from 1800 to 1870 ten hurricanes reached some portion of the Gulf coast with a force so marked as to leave authentic records in the local annals of the region. This is an average of one in each seven years. This average has been maintained since 1870; but no storm has left such an appalling record as the one of September 8, 1900, known as the Galveston hurricane, and it is not probable that we shall again see its counterpart on the Texas coast in centuries.

It is a meteorological coincidence that the West Indies bear the same storm relation to the United States that the Philippines do to China and Japan. With the new possessions of the United States in the Orient it has been possible to establish a storm-warning service that is as valuable to the commerce plying the waters contiguous to the China coast as the service recently organized in the West Indies is to our southern seas.

The hurricanes that occur in the Philippine Islands are called *typhoons*. Like the West Indian storms, they occur mainly during four months of the year—the middle summer and early fall. The late Father Viñes, S. J., a scientist who gave much study to tropical storms, says it must be admitted that cyclones do not form at *any* place within the tropical zones, but that they single out for their formation definite regions within those zones. These regions are always on the southwest periphery of some of the great permanent ocean anti-cyclones. The conditions for the development of cyclones in the tropics are best satisfied when large continents lie to the west, whose coasts trend northward and southward, with extensive seas to the east. Such, at any rate, are the geographic features that concur to form the cyclone regions of the West Indies, of the Philippine Islands, of the China Sea, of the seas of India, of the region east of Africa in the vicinity of the islands of Madagascar, Mauritius, Reunion, Rodriguez, etc.

The cause of all tropical hurricanes may be made clear by confining the explanation to a description of the conditions that permit of the formation of the West Indian storms, which are as follows:

Normally there is a belt of heavy air, of about 10 degrees of latitude in width, lying just north of the tropics, which interposes an almost impassable barrier to the movement of cyclones northward. The region of greatest pressure of this belt is about the middle of the Atlantic Ocean. By August the heat of summer acting on the North American continent has raised the temperature of the air over the land much more than it has that over the water, and the land portion of the high-pressure belt is dispersed, leaving an opening for the escape northward of tropical storms, which form in the ocean on the southwest periphery of the great high-pressure that so persistently remains central over the ocean. From this place of origin the hurricanes are carried northwestward by the general circulation of air outward from and around the big high. This grand summer circulation of the air of the Atlantic Ocean brings the tropical storms nearly or quite to our South Atlantic or Gulf states before they recurve to the north east in pursuing their course around the high. This anti-cyclone of the ocean differs from those that have heretofore been described, in the fact that it quite doggedly holds to nearly the same geographic position. It covers the whole southern ocean, and as the currents of air spirally flow outward, in a direction that agrees with the circulation of the hands of a watch, they frequently break up into small cyclonic whirls of 100 to 300 miles in diameter on the outer rim of the large anti-cyclone, and especially along the southwest quarter of the rim. The air as it runs down through the anti-cyclone feeds the vortices that form at the outer boundaries of the high. The vortex may whirl with the violence of a hurricane, and it usually does; but in its course westward and then eastward it clings to the outer hems of its parent—the anti-cyclone.

The wonderful sweep of the West Indian cyclone is made clear by the statement that storms of August and September may form southeast of the Windward Islands, cross the Caribbean Sea, recurve in the Gulf of Mexico or near the South Atlantic coast, and pass northeastward over the Atlantic Ocean and be lost in the interior of Europe or Asia. The history of these storms and of all others of the oceans is learned by collecting and charting the daily observations from thousands of moving ships in connection with the observations of island and coast stations.

THE TRANSLATION OF STORMS

The air expands upward to an altitude of 50 miles or more. It is so elastic and its expansion is so rapid as it recedes from the earth that nearly one-half of its mass lies below the three-mile level. Our storms and cold waves are simply great swirls in the lower stratum of probably not more than five miles in thickness, which more than likely are caused by the flowing together, on about the same level, of masses of air of widely different temperatures. An elaborate system of cloud observations, made during recent years, shows that the atmosphere, in the middle latitudes of both hemispheres, flows eastward over these agitations of the lower air without being disturbed by them.

In the temperate zones cyclones and anti-cyclones drift toward the east at the usual rate of 600 miles per day, or about 37 miles per hour in winter and 22 miles per hour in summer; but there is no definite rule on which the forecaster can rely. Sometimes they move at twice this speed, and again at less than half of it, or, what is more embarrassing to the prophet, remain stationary for one or two days and die out. It is safest to assume that the velocity of translation of a storm will be the average of the two immediately preceding it, unless the distribution of air pressure over the continent is markedly different in the several cases. Cyclones and anti-cyclones usually alternate, but not always. At rare intervals a rain-storm or a cold wave may be followed by an atmospheric action similar to itself, with only a narrow neutral area between. The most difficult weather map to interpret and make a forecast from is one that contains several partly developed cyclones and anti-cyclones, each of small area and little force. The most that can be said then is that the weather will be unsettled, no definite type of weather lasting more than a few hours.

Four-sevenths of all the storms of the United States come from the north plateau region of the Rocky Mountains and pass from this sub-arid region eastward over the Lakes and New England, producing but scant precipitation. The greater number of the remaining three-sevenths are first defined in the arid southwest states or territories. These nearly always can be relied on to cause bountiful precipitation as they move northeastward over the lower Mississippi Valley and thence to New England. Drouths in the great wheat and corn belts and elsewhere eastward are broken only by cyclones that form in Arizona, New Mexico, or Texas. Storms move faster in the northern part of the United States than they do in the southern portion, and their tracks migrate with the sun.

After the forecaster has spent many years in studying the courses of storms, he learns that, at times, through a gain in force that is not shown by observations taken at the bottom of the air, storms suddenly develop unexpected energy or pursue courses not anticipated in his forecast, or that the barometer rises at the center of the storm without premonition and dissipates the energy of the cyclone. Fortunately, such cases are exceptions.

Chart XII illustrates the courses of summer storms in the United States. The lines show the origin and the tracks of the centers of the cyclones for August during a ten-year period, the anti-cyclones following about the same lines. Adding the numbers at the ends of the lines and at the braces that inclose groups of lines, it is found that 83 storms either had their origin in the states or else came to them from the West Indies or passed up through the ocean near enough to affect the Atlantic coast. The influence of the high western plateau and its mountains in the formation of storms is illustrated by the fact that 57 of these storms had their inception along the mountain system that runs through Colorado, Wyoming, and Montana, and that none came in from the Pacific Ocean. August storms move at the rate of 16 to 26 miles per hour, or about 500 miles a day. Wherever the storms originate they are seen to have a strong tendency ultimately to reach New England.

Now turn to chart XIII, which gives the storm tracks for February for a period of ten years. Against the 83 storms of August there are 98 shown for February for the same period—1884–1893. The tracks curve down farther to the south, many of them come in from the Pacific, and a large number form in Texas, but, like those of August, they finally pass over New England, which fact explains the variability of the weather of the latter region.

As regards storm conditions, the year may be divided into three parts in the Northern Hemisphere. December, January, February, and March are dominated by swiftly moving storms, swinging far to the south and carrying wide oscillations of temperature clear to the northern boundaries of the tropics, with general precipitation ; June, July, August, and September, by ill-defined storms and a sluggish movement of them, with many local rains of small area, rather than general storms, while October and November are transition periods between the summer and the winter types, and April and May between the winter and the summer conditions.

At times there is an abnormal change in the rate of drift of the highs and the lows simultaneously over the eastern and the western continents and the intervening oceans that throws weather forecasts temporarily into confusion. It is difficult to assign a reason to such sudden departures from usual conditions. It may be due to the accumulation of large bodies of air over continents or oceans from which no daily reports can be received. When momentum expends itself against gravity there may be a banking up of air in unexplored regions, and its potential may become suddenly available in such a way as to accelerate or retard the general drift of storms, or it may be due to the complex dynamics of motion of the vast gaseous sphere from which the earth receives light, heat, and various other radiations

When winter has become well established there often develops a permanent high over the great plain between the Rocky Mountains and the coast ranges, which remains inactive for weeks at a time, lows and other highs passing down from the north along its east front without materially disturbing it. Its principal function is to stop the drift of storms into the continent from the ocean immediately west of it. In midsummer the high may be replaced by a stagnant low, and hot scorching winds blow steadily for many days over the states lying east and southeast of the low, withering the wheat and corn of the central Mississippi and lower Missouri Valleys. Charts XIV and XV show the most frequent routes of storms in the Northern Hemisphere.

The influence of the area of high pressure in deflecting storms from their normal or usual course is set forth by Professor Garriott in his paper on "Tropical Storms in September." In this paper Professor Garriott divided the tropical storms of September into three classes, namely: First, those that recurved east of the sixty-fifth meridian; second, those that recurved between the sixty-fifth and ninetieth meridians; and, third, those that passed west of the ninetieth meridian or reached the United States without a recurve. Of the first class of storms, all of which first appeared east of the fiftieth meridian or north of the twentieth parallel, Professor Garriott observes that only two appeared far enough to the south to render their advance over or near the West Indies a probability, and that in every instance the westward movement of the cyclones which recurved east of the sixty-fifth meridian was apparently prevented by anti-cyclonic areas which moved eastward over the Southern states and obstructed the westward advance and forced a recurve to the northward. He states that the recurve of storms of the second class—*i. e.*, those that recurved between the sixty-fifth and ninetieth meridians—was apparently due to the obstruction offered to a westward course by anti-cyclonic areas which had advanced or had been drawn from the continent over the west Gulf and Southwestern states. A large proportion of the third class of storms advanced westward from the eastern West Indies. On their arrival in about longitude west 80 degrees, the average longitude in which September tropical storms recurve, the pressure over the west Gulf began to decrease and rain set in, while the interior eastern districts of the United States were occupied by an extensive area of high pressure. As storms prefer to follow the path of least resistance, the centers moved toward the region of decreasing pressure and avoided the high and increasing pressure to the northward. When the pressure continued high over the eastern districts of the United States the storms were unable to recurve, and were penned in over Mexico or the Southwestern states. In such instances, Professor Garriott states, the cyclones developed great violence before disappearing. Similarly cyclones of this class that advanced northwestwardly toward the Middle or South Atlantic coast of the United States were apparently prevented from recurving by high pressure over the ocean to the northward and northeastward, and, being forced upon the coast, developed destructive energy.

From the foregoing it appears that the effect of distribution of pressure in determining a storm's path is recognized in practical forecasting.

NEW METHOD FOR DETERMINING THE DIRECTION AND VELOCITY OF STORM MOVEMENT

Local Forecaster Edward H. Bowie, in charge of the local office of the U. S. Weather Bureau at St Louis, Mo., has devised a new method of estimating the future course and rate of translation of storms, which, while not being absolute in its determinations, is a marked advance over anything heretofore accomplished in this direction. The unusually high degree of accuracy that has attended Mr Bowie's forecasts for the past several years attests the value of his system. Storms follow the lines of least resistance; but the trouble is that with the movement of vast systems of air, due to the excessive heat of the equator, combined with the rotation of the earth and the continual breaking up of the currents on the outer edges of these systems into cyclonic or anti-cyclonic vortices, the lines of least resistance are always changing, sometimes slowly and again rapidly. The usefulness of Mr Bowie's work lies in the fact that while some of his values are but roughly assigned he has been able by a study of the pressure gradients about the base of the storm, in connection with the general drift of the upper air, to obtain a resultant that approaches with close pre-

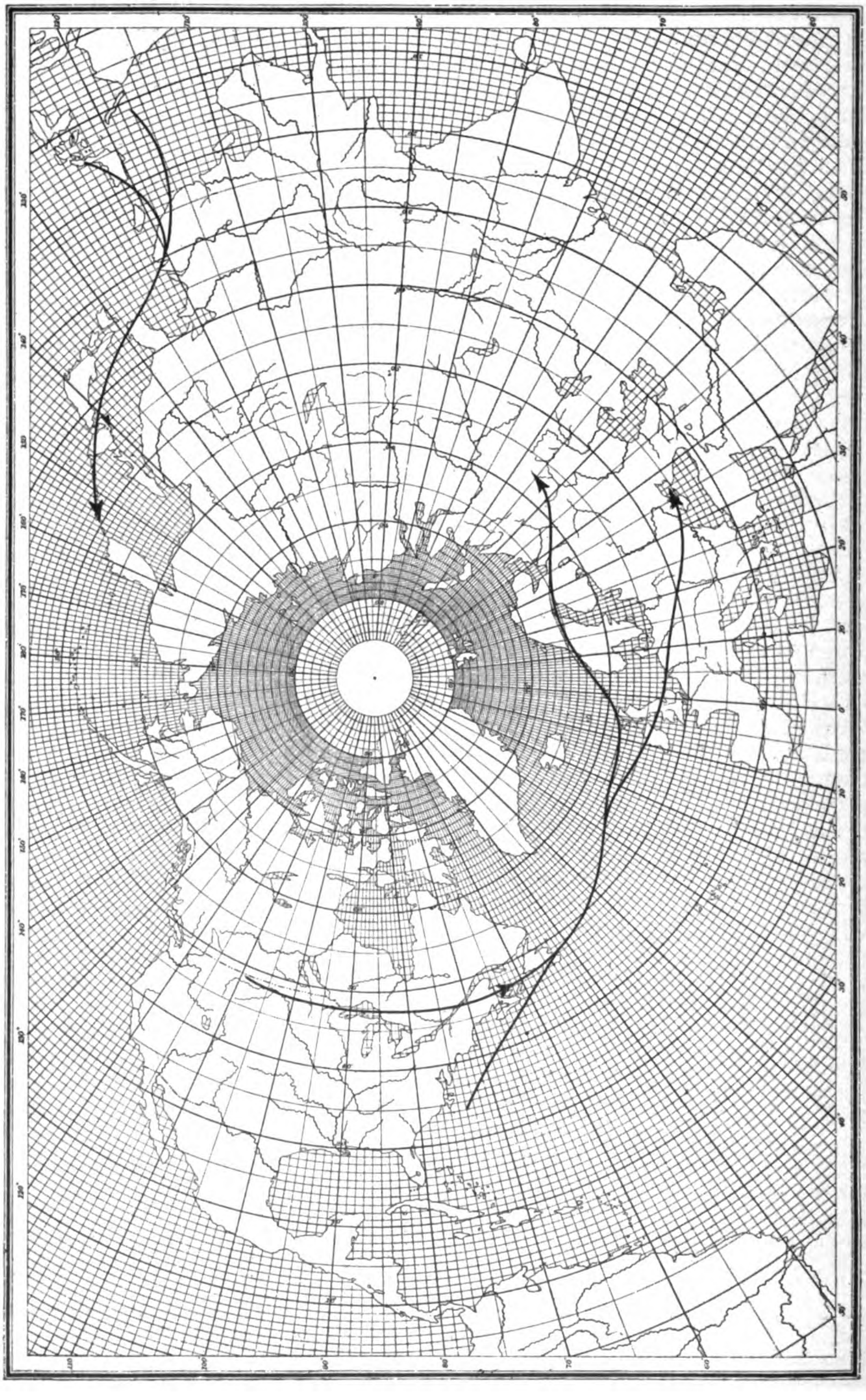


CHART XIV.—The Average Lines along which the Centers of Storms Move in July in the Northern Hemisphere

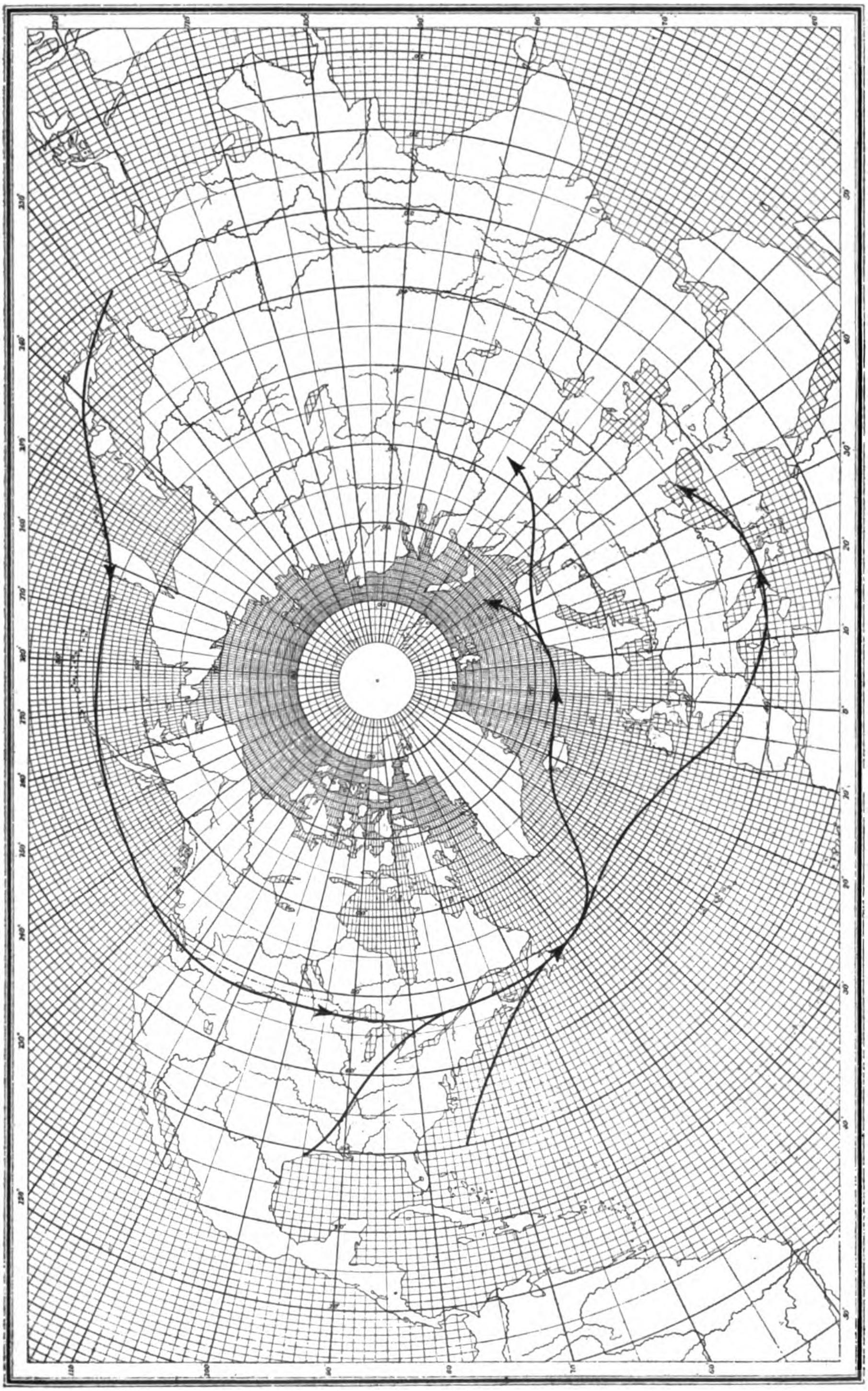


CHART XV.—The Average Lines along which the Centers of Storms Move in January in the Northern Hemisphere cision to the line of least resistance at the moment of the taking of the observations on which the weather chart is founded. In the majority of cases his system locates the place to which the storm center will move during the coming 24 hours with considerable accuracy. It might be improved on by taking into account the *rate of change* in air pressure at all stations during the two hours preceding the observations, and constructing a hypothetical chart based upon such rate continuing for 12 or 24 hours, and then applying the system to the latter chart instead of the real weather map in the effort to determine the future course of the storm.

The description of Mr Bowie's method is told in his own words as follows:

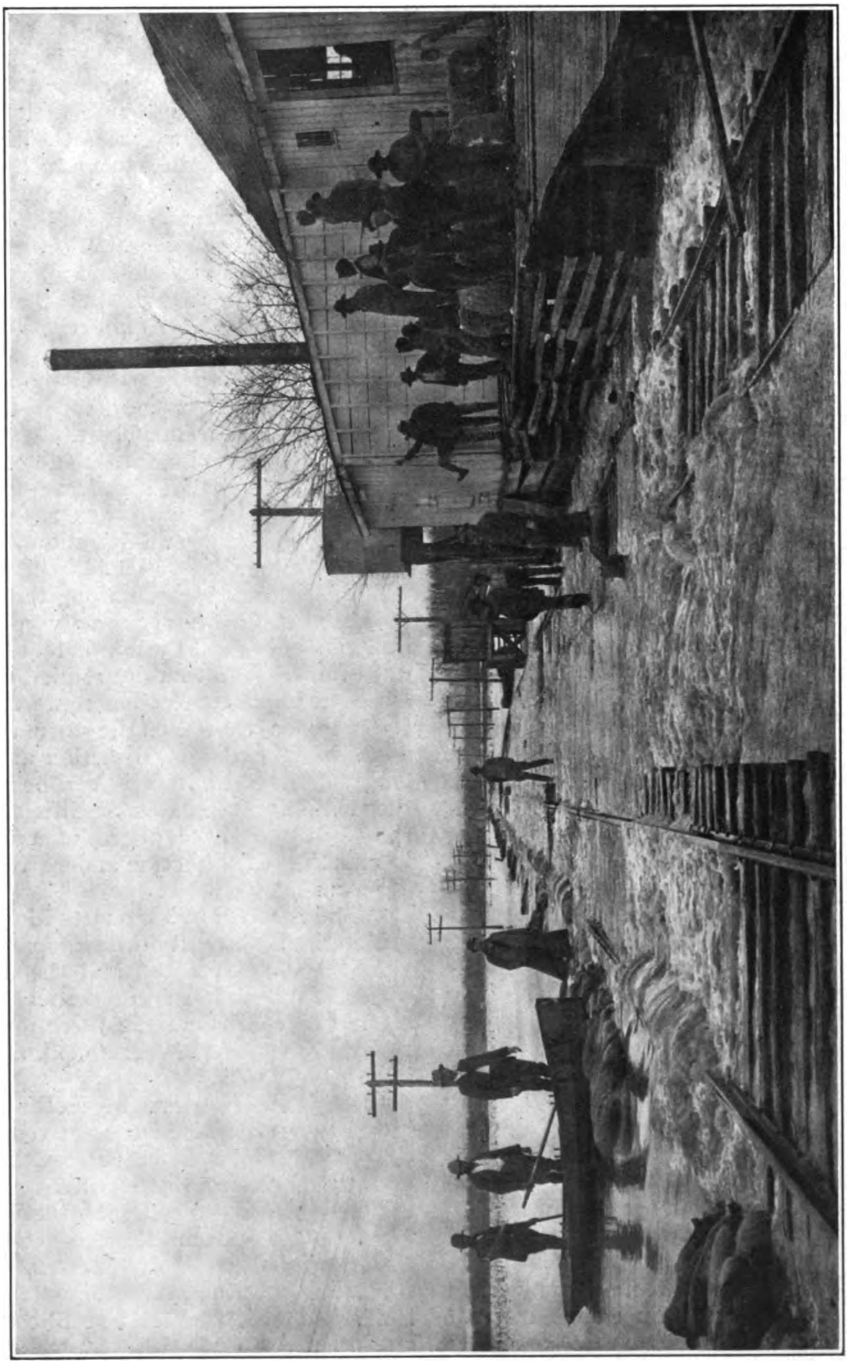
"Assuming erratic storm movement to be due to unequal pressure distribution, it is manifest that the direction and velocity of storm movement could be determined were it possible to obtain correct values that would represent the pressure exerted upon a storm from all directions and the eastward drift of air at high levels that carries the storm with it. Working on this theory, effort has been directed toward obtaining a value that would represent the 24-hour eastward drift from any given locality. To find this value it has been necessary, first, to determine the resultant of the pressure from all directions toward the storm center. To represent this pressure from all directions, lines radiating from the storm center to the north, northeast, east, southeast, etc., have been given, after considerable experimental work, a length of one centimeter for each tenth of an inch increase in barometric pressure along these lines, working with a map the scale of which is 160 miles to an inch, or that of the Washington weather map. The resultant of such lines, or forces, acting toward the storm center, which may be found by the rules governing the polygon of velocities, will show the direction toward which the unequal pressure is forcing the storm.

"If the pressure of the air from all directions toward the storm center be a factor in determining the direction and velocity of movement of a storm, it is obvious that this resultant, representing the value of and direction toward which the unequal pressure forces the storm, becomes one of the components that determine the storm's path.

"As the 24-hour movement of any given storm is the measure of the forces that determine that movement, it follows that by using this resultant of pressure toward the storm center as one of the components which cause the storm to move along its path it is possible to find the other component of motion by resolving a force representing a storm's 24-hour movement into its two components. One of these components, representing the pressure effect, being known, the other component, representing the eastward drift, may be found by the rules governing the parallelogram of forces. If there be a basis for this theory, it must necessarily be that the second component, representing the eastward drift, should have approximately the same direction and value for two or more storms in the same locality for any given month of the year, provided the appropriate value is given the pressure acting toward the storm center from all directions.

"This component has been found for a large number of storms, whose values when charted show an agreement that appears to be more than accidental or merely coincident.

"Having found the component representing the 24-hour eastward drift, which component is apparently fairly constant in value for any particular locality from year to year for a given month and the resultant of the pressure exerted on the storm center from all directions, the value of which is a variable quantity, it is patent that the direc-



A Flood Scene at Marion, Arkansas, 1903

tion and amount of movement of a storm is the resultant of these two forces. Thus, for instance, a December storm charted in Colorado, subject to a pressure that tends to force it southward 400 miles in 24 hours, is during the same period being carried eastward 450 miles by the flow of the upper currents. It is evident that the storm's actual path will lie between the two lines representing the eastward drift and the pressure that forces the storm to the south, the resulting movement being almost due southeast and a distance of approximately 600 miles.

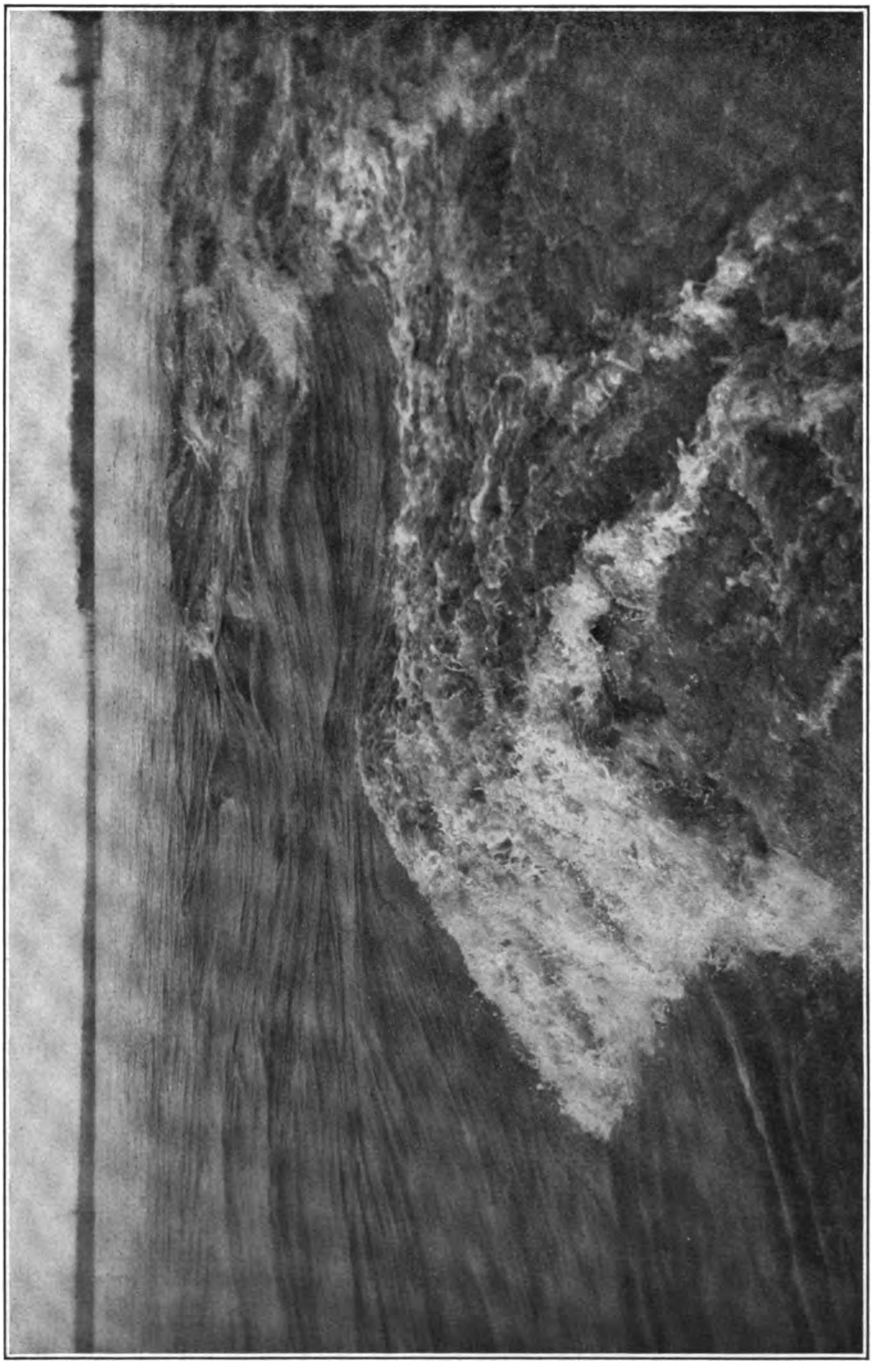
"From a study of storm movement along the lines outlined above it is apparent that the rate and direction of movement of a storm in relation to its normal movement is governed by this variable component, representing the deflective force, or the resultant of the pressure exerted on the storm from all directions; hence it follows that when this deflective force is toward the left (when facing the direction of normal progression) the storm will move to that side of the normal direction of advance, and when toward the right the converse will be true. When this deflective force is acting in conjunction with the eastward drift the storm's rate of movement will be accelerated, and when in opposition the storm's progress will be retarded. It appears that in nearly all instances the storm increases in intensity when this component, representing the pressure of the air toward the storm center, is acting to the left of the normal direction of advance, but when toward the right the storm, as a rule, will decrease in intensity.

"Naturally exceptions are to be found in applying the method outlined above, but in practically all instances the exceptions have been the result of an unforeseen increase or decrease in the pressure toward the storm center from some one of the several directions, which, in addition to offering an explanation of the exceptions, tends to prove the correctness of the principle. Of course the application of the method is limited when the storm center is near a region from which no pressure observations are available—as, for instance, the storms that move along the Canadian border. In cases where there are a number of ill-defined storm centers it is not always possible to determine which center will become the primary one and which centers will be dissipated, and therefore there is more or less doubt whether the deductions will be borne out by subsequent events. In nearly all instances involving exceptions the error in predetermining the movement of the center is apparently due to inability to determine the exact values that should be used to represent the pressure toward the storm center from the several directions.

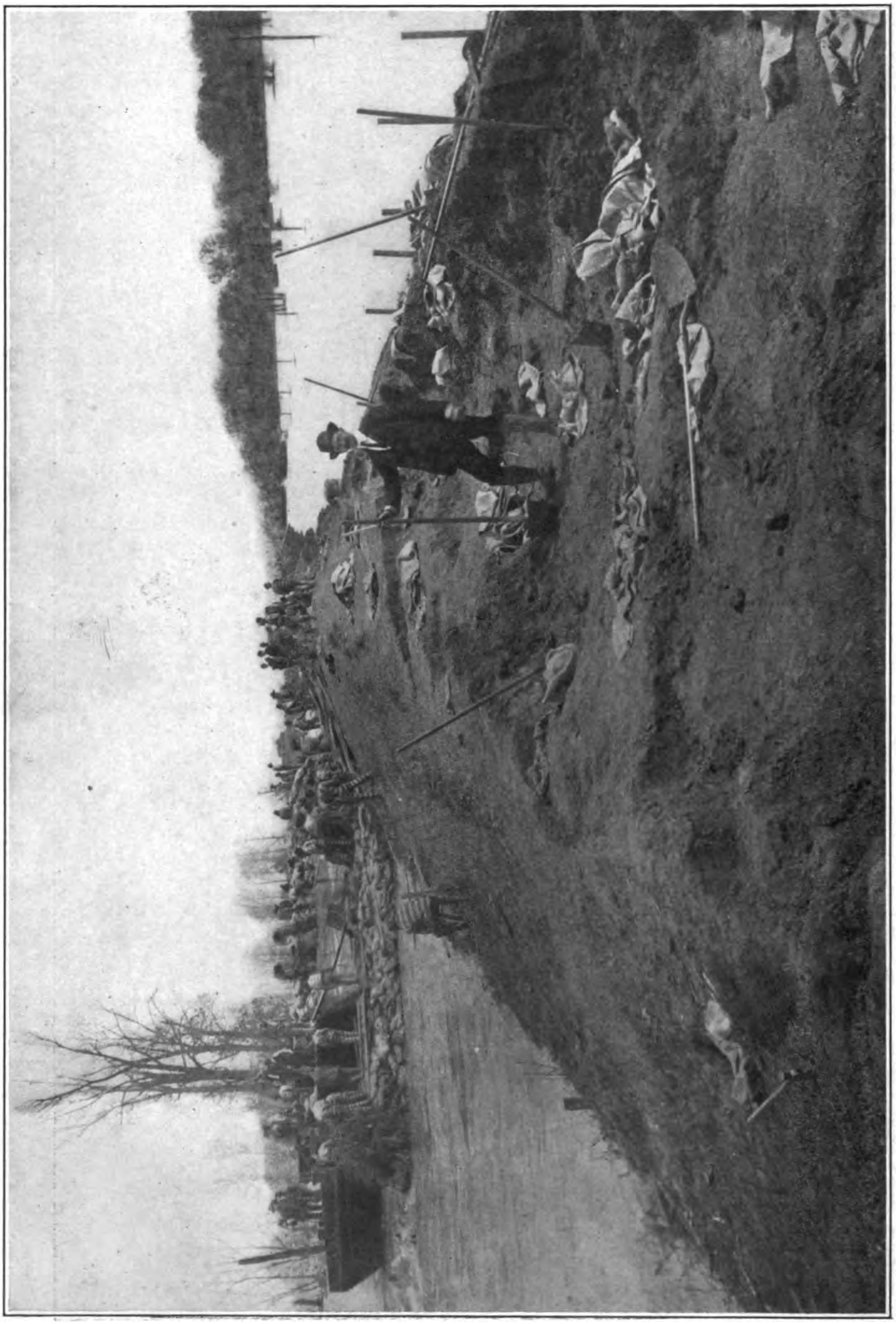
"The values determined by the methods used in the research along the lines indicated above are necessarily approximations only, and therefore tentative; but it is believed that by refined methods of computation values representing the pressure exerted on the storm center as well as the normal direction and velocity of the eastward drift can be found that will show the exact conditions, and thus lead to a higher degree of accuracy in charting the direction and movement of storms.

"The accompanying charts illustrate the method followed in developing the 'normal storm tracks' and the application of the system in practical forecasting to determine the direction and rate of movement of storm centers during 24-hour periods.

"Chart XVI shows the method followed to determine the correct value for each tenth of an inch increase in the barometric readings along lines radiating from the storm center to the north, northeast, east, etc., to represent the influence of the pressure exerted on the storm center from the several directions; it also illustrates the method followed in



The Rush of Water through the Holly Bush Crevasse, Arkansas, 1903



Strengthening the Levees in Preparation for the Coming of a Flood. Lagrange, Mississippi, 1903 developing the 'normal storm tracks' for a given locality. In this figure, drawn to to the scale of the Washington weather map, the vector X represents the direction and movement in 24 hours of the storm that was centered near Amarillo, Texas, 8 a.m., May 26, 1903. The vector X_1 is the resultant of the pressure acting from the north, northeast, east, etc., in the direction indicated, and was determined from an increase in pressure from the storm center outward at 8 a. m., May 26, as follows: To the north, 0.10 inch; northeast, 0 00; east, 0.60; southeast, 0.30; south, 0.30; southwest, 0.30; west, 0.30, and northwest, 0.20, each tenth of an inch being given a value of one centimeter. The vector Y represents the 24-hour movement of the storm that was centered over Amarillo, Texas, at 8 a. m., May 28, 1903. The vector Y_1 is the resultant of the pressure exerted on the storm center, determined, as above, from an increase in pressure from the storm center toward the several directions, as follows: To the north, 0.30 inch; northeast, 0.20; east, 0.60; southeast, 0.30; south, 0.10; southwest, 0.10; west, 0.10, and northwest, 0.40.

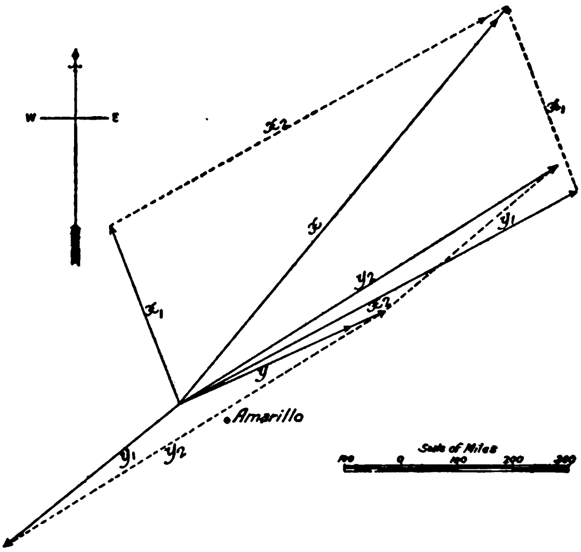
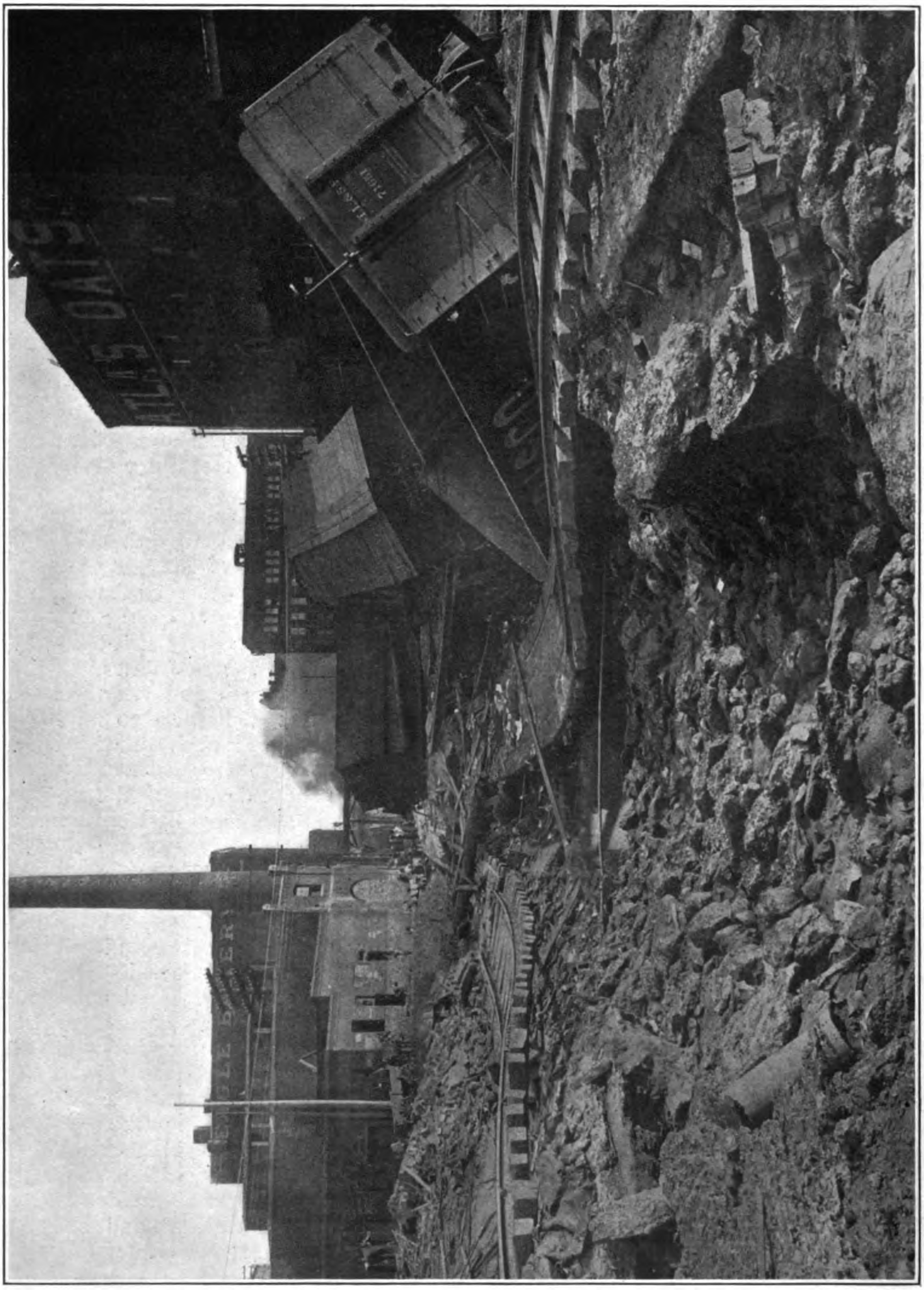
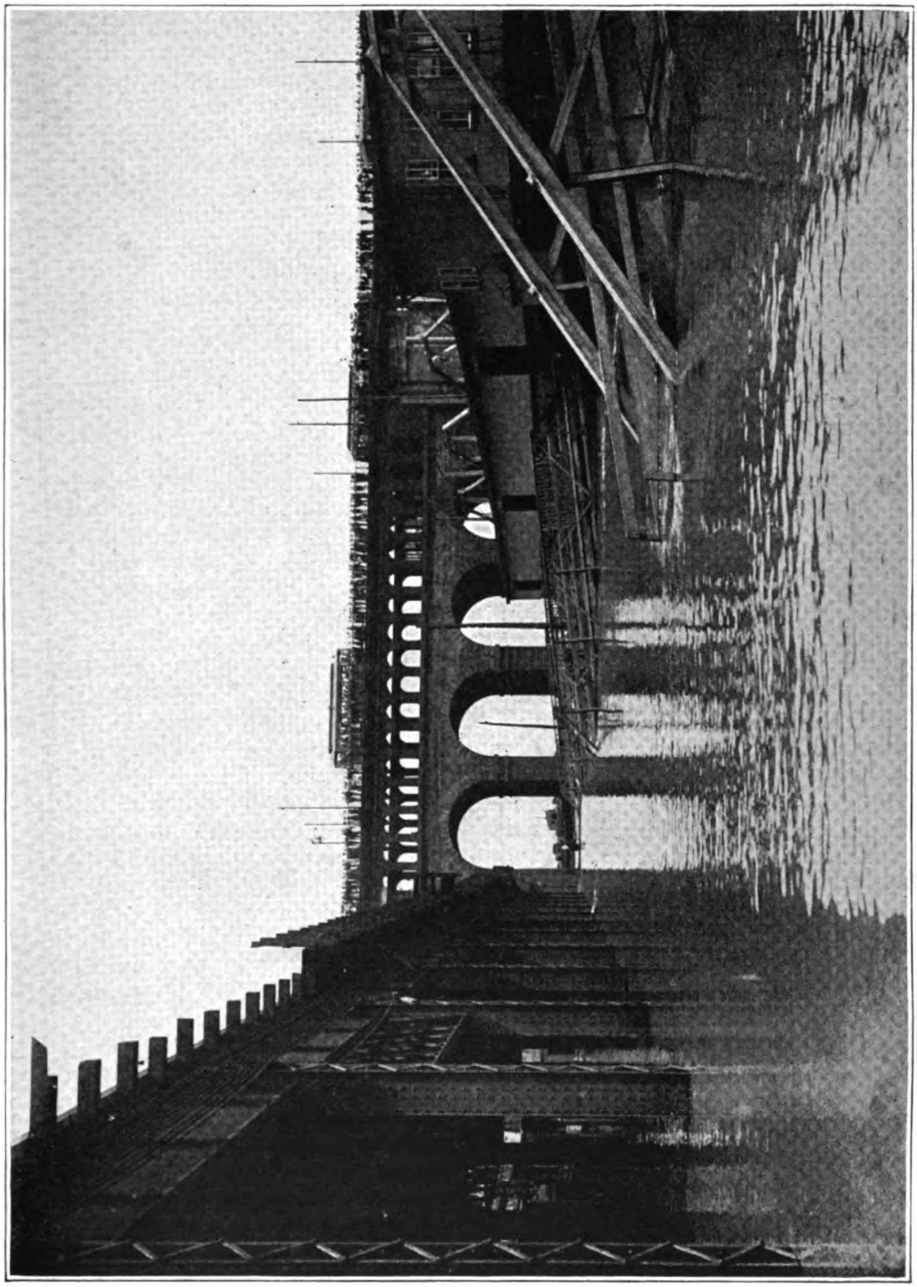


CHART XVI —Showing method followed in developing normal storm tracks and in ascertaining the correct value to represent the pressure exerted on a storm center that causes it to depart from a normal track.

"The vector X being the resultant of the forces that propelled the storm in the direction and to the point indicated in 24 hours, it is possible to eliminate the pressure influence (if it be given an appropriate value) by resolving the vector representing the track of the storm into its two components, one of which, X_1, being the resultant of the pressure exerted on the storm, the other, X_2, will represent the 24-hour value that should be given the general circulation of the atmosphere that carried the storm with it. Similarly, Y_2 represents the 24-hour value that should be given the general circulation that carried the storm of May 28 with it. It will be observed that X_2 and Y_2, representing the 24-hour values of the general circulation on the two dates, are of equal length and vary not more than 3 degrees 30 minutes in direction, from which it may be assumed that the general circulation of the atmosphere in May that carries the storms of the region of New Mexico and northwest Texas with it may be represented by a mean of a number of vectors determined as above. It is manifest, therefore, that should a storm in May in the region indicated be acted upon by a distribution of pressure whose resultant is *zero* its 24-hour direction and rate of movement will be that of the general circulation represented by a correctly determined mean of a number of vectors, such as X_2 and Y_2. Hence such means determined for the various districts of the country have been designated 'normal storm tracks,' and are shown for May in chart XVII.



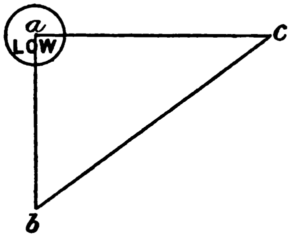
Scene in the Freight Yards at Kansas City after the Visitation of a Flood, 1903



Flood Scene in St Louis, 1903

"The value that should be given each tenth of an inch increase in pressure measured outwardly from the storm center is of vital importance to the correct working of the system, and is arrived at by constructing a number of charts similar to that presented in chart XVI. From an inspection of this figure it is apparent that if the value given each tenth of an inch increase in pressure be decreased the resultants X_1 and Y_1 will decrease in length, and the angle between the vectors X_2 and Y_2 will decrease, but the vectors themselves will become unequal—that is, X_2 will increase and Y_2 decrease in length. (The working of the system is dependent on the assumption that the general circulation, as represented by the vectors X_2 and Y_2, is fairly constant.) If the value given the pressure effect be increased, the resultants X_1 and Y_1 will likewise increase, and the vector X_2 will become shorter and Y_2 very much longer, and, at the same time, the angle made by these lines will increase, from which it follows that a value of one centimeter for each tenth of an inch increase in pressure best meets the requirements in this case."

To determine the future course of a storm in the month of May, for instance, resolve the pressure forces about the storm center into their resultant, then take for the future direction and distance of translation of the storm the resultant between this force and the force illustrated on chart XVII as the upper-air drift or normal storm track as follows:



In which the low is central near New Orleans, *a b* representing the pressure resultant, or line along which the low will be forced if acted upon by pressure gradient only, and *b c* the normal storm track, or the distance and direction of movement of the low as the result of upper-air drift alone, and *a c* the track that the storm center will follow. Hence, instead of the storm moving due south into the Gulf as the result of pressure, or northeast to southwestern Virginia, as chart XVII shows is the place to which upper-air drift will carry it, it moves due east to Jacksonville, Florida.

TORNADOES

The four conditions essential to the formation of tornadoes are usually as follows: (1) A cyclone or area of low pressure, the center of which is to the north or northwest, with a barometric pressure not necessarily much below the normal; (2) a temperature of about 70 degrees on the morning map; (3) a great humidity, and (4) that the time of year be March 15 to June 15. These conditions may and often do exist separately; one or two of them may be found coexisting; but so long as the third be absent, tornadic formation is not likely to occur.

The number of these storms is not increasing; the breaking of the virgin soil, the planting or the cutting away of forests, the drainage of land surfaces by tiles, the stringing of thousands of miles of wire, or the laying of iron or steel rails have not materially altered the climatic conditions or contributed to the frequency or intensity of tornadoes. As well might one by the casting of a pebble expect to dam the waters of the Mississippi as attempt the modification or restriction by the feeble efforts of man of those tremendous forces of nature that surround our earth and control our storms and climate. To be sure, as towns become more numerous and population becomes more dense, greater destruction will ensue from the same number of storms.

It is not possible with our present knowledge of the mechanism of storms to forewarn the exact cities and towns that will be visited by tornadoes without alarming some towns that will wholly escape injury; but we know that tornadoes are almost entirely confined to the southeastern quadrant of the cyclone, and that when the thermal, hygrometric, and other conditions are favorable, the spot 300 to 500 miles southeast from the cyclonic center is in the greatest danger. This fact is well illustrated on chart XVIII, showing the cyclonic system that existed at 8 p. m. on March 27, 1890, the day of the famous Louisville tornado. Two red lines, drawn at right angles to each other, divide the area of the storm into four quarters. Twelve tornadoes, represented by short red lines, mostly in the southeast quarter of the general cyclone, occurred during the afternoon or evening of the day. As most of these occurred several hours before 8 p. m., the time of the taking of the extensive system of observations on which the chart is based, when the center of the cyclone was 100 or 200 miles farther west, it is apparent that they all operated somewhere within the southeast quarter of the general storm, although exceptions to this rule occasionally occur.

It is desirable to make clear the difference between the cyclone and the tornado. The majority of the press and many persons who should know better use these terms as synonymous. The cyclone shown on chart XVIII, which is fairly typical of all cyclones, is a horizontally revolving disk of air, covering the whole United States from the Atlantic Ocean westward to and including the Mississippi Valley, with the air currents from all points flowing spirally inward toward the center, while the tornado is a revolving mass of air of only about 1,000 yards in diameter, and is simply an incident of the cyclone, nearly always occurring in its southeast quadrant. The cyclone may cause moderate or high winds through a vast expanse of territory, while the tornado, with a vertical motion almost unmeasurable, always leaves a trail of death and destruction in an area infinitesimal in comparison with the area covered by the cyclone.

The tornado is the most violent of all storms, and is more frequent in the central valleys of the United States than elsewhere. It has characteristics which distinguish it from the thunder-storm, *viz.*, a pendent, funnel-shaped cloud and a violent, rotary motion in a direction contrary to the movements of the hands of a watch, together with a violent updraft at the center.

Right here it is well to inquire if a satisfactory reason can be given for the occurrence of these violent agitations of the atmosphere mainly during the spring and early summer, and usually only in the southeast quarter of the cyclone. In answer it may be said that an hypothesis can be formulated that fairly well satisfies the requirements of the case. First, one must recall the fact that the atmosphere, even at the surface of the earth, is not dense enough to absorb but a small part of the solar heat waves. They therefore reach the earth and warm its surface, but the absorbed heat does not penetrate to any great depth, because the land is a poor conductor, but a good absorber and a good radiator. The land therefore retains its absorbed heat near the surface and quickly and freely radiates that which it has absorbed. The atmosphere, which is a poor conductor, is thus rapidly warmed at the bottom, but the heat is slowly conducted upward, and in the spring of the year the gaining intensity of the solar rays and the increasing hours of sunshine warm a thin stratum of air next the earth to an abnormal degree of heat in comparison with the stratum next above, which still retains the cold of winter. This abnormality is accentuated in the southeast quadrant of the cyclone, wherein southerly winds still further add to the heat of the lower stratum and increase the humidity. An unstable condition then ensues, in which heavier air is superposed on lighter and much warmer air. This unstable equilibrium is more often relieved by the breaking through, here and there, of masses of the heavier air and its horizontal rolling along the surface of the earth, with the warm and cold masses driven together by electric explosions; these are thunder-storms. But at times dry and extremely cold air are brought together with humid and very warm air, with the result that a narrow vertical whirl is set up which develops great vortical energy; this is the tornado. The tornado also may be caused, and many times is, by the cyclone whirling together on the same level the cold currents from the northwest and the warm ones from the southeast, especially at an elevation of a few thousand feet, in the interior layers of the cyclone. The vortex then burrows downward to the surface of the earth, or dances along with the tail of the funnel whipping from side to side, and touching only the high places or nothing at all.

Tornadoes mostly occur between 2 and 5 in the afternoon, and generally move from the southwest to the northeast; their tracks may vary in width from a few hundred feet to one mile; their velocity of translation is usually about that of an express train; their speed of gyration can be measured only approximately, but as it is sufficient often to drive straws a half inch into the bodies of trees it must equal or exceed the velocity of a rifle bullet. Professor Biglow says: "The vortex of a tornado obeys the laws of the movements of fluids in gyratory circulation. If a mass of air 6,000 feet in diameter is rotating at a half-mile level and it runs into a vortex so that the tube is 100 feet in diameter at the top, and supposing the outer edge of the upper vortex makes 7 miles an hour, then at the rim of the bottom of the vortex we should have a velocity of 200 miles an hour. This causes an enormous centrifugal force in the lower tube, a high vacuum, and low temperature. The vacuum tube causes the explosive and disastrous effects upon objects in its path." The cold of expansion condenses the vapor that makes the tube visible, and the sudden condensation causes electric discharges of great violence. A roaring like the sound of a thousand express trains accompanies the tornado, whose track is usually 5 or 10 miles in length, and whose rate of movement is about 30 miles per hour.

The writer visited St Louis the day after the tornado of May 27, 1896. He was especially impressed with the fact that many of the buildings seemed to be burst outward at their upper stories, indicating that at the time of their destruction they were near the center of the rotating mass of air, where centrifugal force had reduced the air pressure on the outside to such an extent that the expansion of the air in the upper stories of the houses whose windows and doors were closed had produced an explosion of the building. In one case all the four walls of the upper story of a house were thrown outward, leaving the lower story intact and the roof resting in proper position one story lower than in the original building. Again, great structures seemed to have been crushed over or taken up bodily and scattered in all directions.

The fact that this tornado traveled with destructive force through several miles of brick buildings and yet left the city with greater force than it possessed on entering it illustrates the futility of planting forests to the southwest of cities for purposes of protection, as some have advocated. The strongest trees would offer but little more resistance to the tornado than would so many blades of grass, and the drawing off of the electricity of the clouds by the projecting points of the trees would have no effect, as it never has been shown that electricity has anything to do in originating tornadoes; it is rather a result than a cause. The planting of trees is a useful occupation, even if they have no effect on tornadoes; but what shall one say of the municipality that hires a cannoneer to guard the southwest approaches to its city and to destroy with shot all tornado clouds, as a small western city once did. Still its action was no more ridiculous than is that of certain provinces in Europe that annually expend large sums of private and public money in the shooting of hail clouds, or of otherwise intelligent people who aid and abet the most ignorant of charlatans in their pretensions of making rain or of forecasting the weather months in advance.

There is a wide variation in the number of tornadoes that occur during the years. Chart No. XIX shows the location and the direction of movement of all the tornadoes of a year of small number, and chart XX shows the result of a year of great frequency.

FLOODS

With our many thousands of miles of navigable rivers flowing through one of the most extensive and fruitful regions of the world, daily forecasts of the height of water in the various sections of each river are of enormous benefit to navigation, and the warnings issued when the precipitation is so heavy as to indicate the gathering, during the near future, of flood volumes in the main streams are often worth many millions to navigators and to those having movable property on low grounds contiguous to the streams.

The feasibility of making accurate forecasts as to the height of water several days in advance at any station of the system is no longer questioned, and at stations on the lower reaches of rivers one to three weeks' forecasts are feasible. The forecaster at each river center considers the rainfall, the temperature, the melting of snow, if there be any, the area and slope of the watershed, and the permeability of the soil. From a study of floods in former years he knows the time necessary for the flow of the water from the tributaries to the main stream and the time required for the passage of the flood crests from one city to another. The forecasts are, of course, empirically made, but still they are sufficiently accurate to possess great value to the people of the river districts.

Some idea of the vast destruction of property due to floods may be gathered from the statement that the floods of 1881 and 1882 caused a loss of not less than $15,000,000 to the property interests of the Ohio and Mississippi Valleys. There was also a loss of 138 lives. In 1884 the region of the Ohio alone suffered a loss of over $10,000,000 in property. In 1897 the loss along the several great rivers was more than the sum of the two large figures just written, and in 1903 the destruction of property might fairly be estimated at $40,000,000 in value.

From data that now covers many years at a large number of stations the following general relations have been deduced: The time it takes high water to pass from Pittsburg to Wheeling is one day; from Pittsburg to Parkersburg, two days; from Parkersburg to Cincinnati, three days; from Cincinnati to Cairo, six days; from Cairo to Vickburg, seven days, and from Vicksburg to New Orleans, four days. The time, therefore, from Pittsburg to the Gulf is 23 days. Similar general relations concerning the movements of other rivers have been determined. Since the time is so great—the movement of high water being a little slower than the current—

it follows that many interfering conditions may arise, tending to retard or accelerate the passage of the crest of the flood wave. No absolute rule is, therefore, possible; but the forecasting of the exact flood stage many days, or even weeks, in advance at important river stations is of such frequent occurrence as to indicate that, although the forecasts are empirically made, they have a substantial commercial value.

Each forecaster in charge of a river center has a definite section of the river system to watch and for which he must forecast. He receives the necessary telegraphic reports of the daily rainfall that has occurred over the tributaries to his river district, reports of the gauge readings nearer the source of the main river than his own station, and gauge readings from many of the tributary streams. He is familiar with the area of the catchment basin from which his rainfall reports are received, the contour and configuration of the surface, and the permeability of the soil. A slowly falling rain of considerable amount on a nearly level and permeable soil may cause little rise, while a rapidly falling rain of the same amount on an impermeable and greatly inclined surface will gather quickly in the channels of the tributaries and soon become a rushing torrent in the main stream. It is thus seen that many modifying conditions must be taken into consideration. The forecaster studies the history of previous floods under various temperatures and absorptive conditions of soil. He knows that the rainfall may be augmented by the melting of snow, if any there be on the ground, and that the temperature is an important factor in the flood; that on a frozen soil, under moderate heat, the entire precipitation, plus meltage, may flow away without appreciable absorption or evaporation and create higher water in the rivers than would be the case if the soil were open, and that an unfrozen but saturated soil presents to the flowing water practically the same surface, so far as the latter affects the flood, as a frozen soil. Of the precipitation that is absorbed a part is evaporated, a part taken up by vegetation in making its growth, and the remainder sinks to the impervious rock, which lies at no great depth below the surface. It slowly follows the slope of the rock, and gives rise to the springs that supply the steady flow of the streams and rivers. This portion of downpour, while unimportant in the causing of floods, needs to be considered by the river forecaster, for an abundance of well-absorbed rains during the spring and early summer means the maintenance of fair stages in navigable rivers during the usual low-water season, and forecasts of low-water stages are nearly as important to commerce as the prediction of flood heights. In brief, floods have their origin in the surface discharge, while the low-water flow of streams is mainly due to the underground waters.

The *zero* of a river gauge is placed at the level of the lowest water known, and if at any subsequent time a stage still lower is recorded it is read as a minus quantity. The *danger line* varies with the locality. On the Ohio river, on account of its narrow channel and its precipitous banks, the water must show vertical rises varying from 30 to 50 feet before the danger line is reached. At Cincinnati the danger line is 45 feet above the zero of the scale, and a height of 71 feet has been recorded. On the upper Mississippi the danger lines average about 15 feet above zero, but from St Louis to Vicksburg they average about 35 feet, while at New Orleans the danger limit is but 13 feet above zero. An impermeable ground, such as that over granite bed rock, is marked by many rivulets and streams in comparison with the number that are found in a permeable soil of equal rainfall. When at great intervals a stream does appear in permeable ground the flow of water may diminish as the stream progresses, the water being absorbed by the soil or sinking through it to the bed rock. Much of the water absorbed never reaches the rivers. In the Ohio Valley the amount of water drained away by the rivers is about one-fourth of the rainfall, which is the same as in Europe; in the Missouri Valley the amount is only one-eighth. These conditions have an important bearing when considering what river stages will be effected by a given rainfall and what will be the rate of rise. In an impermeable region the rivers rise rapidly and as quickly subside; in a permeable region the rise and the fall are slower in action and the amplitude of the movement less.

In small rivers the slope may fall away at the rate of four to seven feet the mile, while in large rivers, like the Mississippi, the slope is only about one-fourth of a foot. The velocity of a river does not depend alone upon the slope, but also upon the mean hydraulic depth, the square root of the two measures determining it closely.

The *regimen* of a river is the history of its movements and their causes. It may be modified by a change in forest areas or in the area under cultivation. Cultivated ground allows of a much greater absorption than wild soil, and therefore holds in storage and conserves the supply for springs and streams after flood seasons have passed. It is therefore a question if civilization has not thereby considerably reduced the intensity of floods, notwithstanding the cutting away of forests, the area cleared of forests being small in comparison with the total area changed from a wild to a cultivated state; but before a hasty conclusion is reached one should not forget to consider that forest coverings reduce to a minimum the amount of silt carried to streams, especially from steeply tilted surfaces. They hold the soil and prevent its washing away to the rivers, where it is deposited in such a way as to build up the river beds and possibly cause greater overflows than with the former larger volume of water and less silt. Many have thought that the leveeing up of the Mississippi River will cause a building up of the bottom of the river by the confining between banks of large quantities of silt-laden water that formerly deposited most of its sediment on the adjacent flats before moving down the stream; but here again account is not taken of the fact that the leveeing up of the river increases its depth, and therefore its velocity, and the carrying capacity of a stream increases as the cube of its velocity. It is probable that the bed of the river has not risen since a considerable portion was confined by levees. Many gauges that were established more than thirty years ago occasionally show minus readings.

The various flood scenes illustrated in this paper tell each its own story.

GEOGRAPHIC NOTES

WHAT IS THE POPULATION OF CHINA?

WHEN I first studied geography the population of China was estimated at 230 millions; then came an advance to 360 millions; now we hear of over 400 millions, and if the latest figures are correct there is reason for talking of the "Yellow Peril."

Upon what have these estimates been based? Has anything like a census ever been taken of the Chinese people? Probably not, though the Peking government, no doubt, receives reports concerning the number of people in the different provinces. The published information must have been derived mainly from travelers, missionaries, diplomats, and naval officers.

From my own observations during the three years I was on the Asiatic Station, I would say that there are less than 200 millions of people in China, and perhaps some of the contributors or readers of the NATIONAL GEOGRAPHIC MAGAZINE, who have had better opportunities to judge, will show why or to what extent I am wrong.

I spent several months in each of the principal seaports from Tientsin in the north to Canton in the south and five or six months in the Valley of the Yangtze, going as far inland as Ichang, a town nearly 1,000 miles from the sea, and beyond the reputed populous districts. I noticed that the country people instead of living on farms were concentrated in villages, and that these were generally small and often widely separated.

The cities were limited in area and contained no lofty buildings, one and two storied houses being the rule. Canton is the wealthiest, and, with the possible exception of Peking, is the most populous city. I was with a party that made the circuit of the walls, several members walking the entire way in a little over two hours, which proves that the enclosed space could not have exceeded six square miles. In the northern part we saw gardens and unoccupied ground. Compare this with Manhattan Island, with its 22 square miles and lofty tenement houses.

The streets of a Chinese city are very narrow, and the people live in them and on the ground floor of the wide open shops and houses, therefore the visitor seems to be always working his way through a dense crowd.

I believe that tigers are encountered in all portions of China. It is certain that they are killed north of Peking, as the skins are sold there, and at Amoy the missionaries, who had been inland, told me of the terror they inspired. As there is little of the dense undergrowth of India it is a comparatively open country through which the tiger prowls, and his presence certainly does not suggest a land densely populated.

C. E. CLARK,
Rear Admiral, U. S. Navy.

The article on "Forecasting the Weather and Storms," by Dr Willis L. Moore, Chief of the United States Weather Bureau, published in this number, is an advance chapter from "The New Meteorology," a text-book on weather science which is in course of preparation by Dr Moore and which will be published in a few months by a well-known firm. The chapter is published here in advance of the appearance of the book through the courtesy of Dr Moore. The members of the Society will undoubtedly enjoy the interesting and lucid explanation of storms and weather given by Dr Moore, and will also appreciate the good-will of an author who permits the publication of a chapter in advance of the completed volume.

The map showing the present seat of war in eastern Asia which appears as a supplement to this number of the NATIONAL GEOGRAPHIC MAGAZINE was prepared by the Military Information Division of the War Department and is republished by the National Geographic Society through the courtesy of Major Beach, chief of the division. It is believed that the map will prove particularly useful to those who are following military developments in Manchuria.

GEOGRAPHIC LITERATURE

Excursions and Lessons in Home Geography. By Charles A. McMurry, Ph. D. Pp. 152. 5 x 7½ inches. New York: MacMillan Co.

A much-needed book, containing many fine illustrations. The student can find out from its pages anything from the way his own particular part of the country was formed to the most approved method of milking cows and maintaining a sanitary dairy. The book is written in such simple language and is so well expressed that any one can understand and enjoy it.

The Philippine Islands, 1493–1898, vol. XXI. Edited by Emma Helen Blair and James Alexander Robertson. Pp. 317. 9⅝ x 6⅛ inches. Cleveland: The Arthur H. Clark Co. 1905.

In this 21st volume the publishers have got down to the year 1624 in their monumental undertaking. This one deals entirely with religious matters for that year, being composed of sources bearing on ecclesiastical squabbles, the founding of a Japanese seminary, and the labors of the early Recollect Missions. The last forms more than half of the book, and, like Jesuit writings, contains very valuable descriptions of the country, the people, and their customs. Typographically the book is almost perfect for use, the print being large, the paper heavy, and the binding excellent. It seems a great pity that this enterprising firm should suffer a loss in their effort to advance the cause of knowledge. C. M.

Along the Nile with General Grant. By Elbert E. Farman. Pp. xviii + 339. New York: The Grafton Press. 1904. $2.50 *net.*

The voyage of General Grant up the Nile to the First Cataract, in 1877, serves in this volume as a reason for its publication. The chapters on Luxor, Abydos, Thebes, the Temples of Karnak, and the Islands of Philae and Elephantine are evidences of Judge Farman's careful observations of the remarkable antiquity of Egypt. The volume is unusually well illustrated, and will be of special interest to those who have made, or contemplate making, the tour of the Nile. A. W. G.

Dodge's Advanced Geography. By Richard Elwood Dodge. Pp. 333 + xix. 9 x 7⅞ inches. Chicago: Rand, McNally & Co. 1904.

The distinguishing conception of this work is the emphasis laid upon the "causal notion" in geography—that is, that our civilization is the result of natural conditions. First come geographic principles, then their application in the second part, with a rapid view of the different continents and leading countries of the world. The orderly growth of industrial life from natural conditions is the central theme in all cases. Each important region is represented by three maps, relief, political, and commercial. There are many beautiful illustrations and helpful suggestions.

The writer of the text has likely never gone over this ground thoroughly as a teacher, else some defects would be absent. It seems a waste of space to tell us that little is known about polar winds (50). There is much haziness about monsoons and summer and winter winds (48, 49, 50). There is a troublesome mixture of the terms "miles" and "degrees" (89). It is confusing to speak of "northwest trade-winds" (319). Yokohama does not have an excellent harbor. To speak of Georgia growing sugar "extensively" (144) and then in the diagram (149) to show how insignificant her total is will puzzle most young minds. The work of the cartography "expert" is decidedly the most unsatisfactory part of the book. He has sugar-cane over nearly all of South Carolina (148). He has a big cotton area in the middle of the south Pacific (330). In other places he fairly riots in details, crowding his maps to such an extent that they are scarcely more than "labored ingenuities." Many of them are utterly beyond the capacity of children of the age of those who are expected to study this book. So far as the publishers' part goes, the maps are of the best workmanship, except that the contrast of colors in the physical ones is not so marked as it should be.

But in spite of these weaknesses there is hardly a volume the equal of this for developing the thinking powers of the pupils, and hence is the best this reviewer knows of. C. M.

The United States of America. By Edwin E. Sparks. 2 volumes, maps. Pp. xi + 425; vii + 385. Illustrated. New York: G. R. Putnam's Sons. 1904.

This is a most welcome and valuable addition to The Story of Nations' series. It commences with the treaties of peace in 1783 and traces the evolutionary stages through which the United States passed, from a confederacy of republics to its present status as a powerful nation, clothed with all powers needful for its progress and preservation.

Perhaps the most interesting chapters are those outlining the fundamental bases on which centralization has been effected. Therein Prof. Sparks clearly indicates the most potent lines of action and their specific effects. The Jeffersonian ordinance of 1784 with unqualified suffrage, the erection of the back lands into equal independent states, the home-making public-land system, the light-house and post-route policies, the assumption of the states' debts, the entrustment of the militia to executive control, the appropriations for scientific purposes, the adoption of excise and tariff measures, and the construction of the general welfare clause of the Constitution are given due weight and consideration.

As to the later phases of our national history, the chapter on profit-sharing and paternalism, on abolitionism and colonization, and the passing of strict constitutional construction throw instructive side lights on the march of events.

National industrial development is too currant and political a topic for purely historical treatment, and from the nature of the case cannot be universally accepted.

Altogether, the literary style, subject-matter, and method of treatment are excellent. There is not a dull chapter in either volume. A. W. G.

Grundriss der Handelsgeographie. von Dr Max Eckert (Privatdozenten der Erdkunde an der Universität Kiel). Pp. xv + 517. 9 x 6 inches. Leipzig: G. J. Goschen'sche Verlagshandlung. 1905.

This is a very comprehensive summary of facts rigidly based on the great causal notions of geographic development. Following a simple and uniform plan, our author treats the continents and then the countries of the world, first giving a brief view of the land and the people of each, then the natural resources, then the industries and occupations, and, finally, communication and trade. The three great divisions of the material world, plants, animals, and minerals, are in each case described, with the next section pointing out the industries that have sprung up in that country, but he leaves the student to supply the links of connection; and that brings up one serious defect of the work. It is a frightfully dry compilation of names and figures, unrelieved by any graces of expression or interesting incidents. It is difficult to see what place it would fill in education, as it is too heavy for American students, and many of the statements are annually superseded by almanacs or hand-books. It is not sufficiently scientific to be accepted as an authority in itself, since the sources of information are not often given. For general style and interest it is much inferior to the International Geography. C. M.

WE have published a new edition of our map of Alaska, which was prepared by the United States Geological Survey. The map is 36 by 42 inches, in 3 colors, and is the first contour map of Alaska that has been made. : : : : By mail, 25 cents.

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EVOLUTION OF RUSSIAN GOVERNMENT*

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COUNTLESS questions arise at the very mention of the name of Russia. Many of these questions are of vital interest and interwoven with the crisis in the Far East. Nevertheless, I shall endeavor to push all other issues aside and devote myself entirely to the single subject—The Evolution of Russian Government.

At the beginning I am confronted by one peculiar difficulty. It is that I am an American and that the great majority of my hearers are of the same nationality. I know, indeed, that in no other country under the sun is there so large an acquaintance with foreign matters as in the United States. In no other is there so large an ability to judge of foreign questions, of their causes and ultimate solution. But this advantage is more than counterbalanced by the difficulty created in our minds through the rapid progress of our political life. We have not yet attained, nor are we altogether perfect. Sometimes things are done in this our boasted country which cause us shame. Nevertheless, we have represented during the last 125 years the foremost constitutional, self-governing experiment of mankind. Only a little more than a century ago did our fathers draw up that Constitution which is still our organic law. There did not then exist a single other written constitution, defining civil functions and regulating the relations of different departments of state. We were the first who ever embarked upon the sea of national self-government under the ægis of a constitution formed by the people. Hence it is difficult or impossible for us Americans to fully realize how rapidly we have advanced under the guidance of a brief but an enlightened experience. The rapidity with which we have rushed forward since astounds the beholder, but is barely perceived by ourselves. For we are in the very midst of the progress, and meanwhile receive and share all that is being achieved. The fleet-footed are not tolerant of the slow. Scant patience have we for the tardier progress made by nations in less favorable conditions than our own. The same step must they keep and push on with the same tireless speed. Great Britain, surrounded by the inviolate sea, and safe from even the threat of a hostile foot, has wrought out farther than any other people, perhaps farther than ourselves, the application of principles to civil and constitutional government. But her as yet unwritten, unformulated constitution has had a thousand years for its making.

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*An address to the National Geographic Society, February 3, 1905.

The nations move on like troops of soldiers in a long and weary march Some reach the place of bivouac and light the camp-fires while others are straggling far behind. Some of the seeming loiterers have been pressing on all the time toward the bivouac as the rear guard, with their faces to the foe ; and others are struggling forward, wounded and disabled, with slow and uncertain step ; and others still, because of less ability, of less forceful energy, but with just as strong determination and just as good a will, find themselves, when night approaches and time for halt has come, far from the bivouac and the front. Around one nation gleam the watch-fires of the twentieth century; another is fifty years behind ; a third is groping still among the breaking shadows of the eighteenth century, and yet another has only of late emerged from the darkness of the middle ages.

RUSSIA LEFT THE MIDDLE AGES IN 1689, 240 YEARS AFTER THE REST OF EUROPE HAD EMERGED FROM THAT DARK PERIOD

To the close of the middle ages in western and southern Europe are assigned different dates. There modern times began four or five hundred years ago, perhaps when Constantinople fell or when Luther and Raphael were born or when America was discovered. Then universal disorder ceased ; centralized states stood forth ; the various peoples felt new thrills of national life. With the ascent of the boy, Peter, to the throne the middle ages were ended in Russia. That was in 1689. Thus in the onward progress the inhabitant of other parts of Europe had by two hundred and fifty years the start of the Russian.

THE INFLUENCE OF THE PLAIN

The Russian had been left thus far in the rear by no fault of his own. In natural endowment the Slav is not inferior to the Latin or the Teuton or the Celt. Geographic conditions and geographic environment determined Russian history and molded Russian nature. In that enormous plain, which constitutes the Russia of today, mountains, at once a bulwark and defense and inspiration, were denied him. The Scotch, the Swiss, like the Vaudois Christian, could sing :

> " For the strength of the hills we bless Thee,
> Oh ! God, our father's God ;
> Thou hast made thy children mighty
> By the touch of the mountain sod."

But the dwellers of the plain, exposed to attack from every side in a wild and lawless age, had no other destiny than to suffer and endure.

After the barbaric invasions ceased in western Europe, for generations countless Asiatic hosts roamed over Russia, sparsely populated and difficult of defense, and devastated the land at will. Moreover, the sunless forest and dreary steppe wrought upon human nature their repressive influence. Physical conditions fashion character as the sculptor shapes the clay. Thence were developed those traits of sluggish patience, of long endurance, of morbid self-sacrifice which distinctly mark the Russian people today.

ADVANCES BEGIN AT THE TOP AND WORK DOWNWARD

In most countries each political or economic advance has derived its first impulse from popular feeling which swelled into a resistless demand upon authority—that is, the progress has begun from below and worked upward.

In Russia the very opposite is true. There almost every advance has received its first impulse from the Tsar—that is, the progress has begun from above and worked downward. Thus, for example, were brought about the emancipation of the serfs and the institution of the zemtsvos. Peter the Great was the typical Russian Tsar, though built on the most majestic and colossal scale. He forced his reforms upon an indifferent or unwilling people. While many Russians are, from one point of view, enlightened and others are crudely educated and correspondingly radical, the fact remains that to any proposed change the masses block the way; nor is it strange that the reforms in other lands extorted from the rulers by the people are in Russia, if they exist at all, forced upon the ruled by the ruler. No other process is possible among a people conservative by instinct and tolerant only of autocracy.*

THE PECULIAR ATTITUDE OF THE RUSSIANS TO THEIR TSAR

In May, 1896, as magnificent a panorama as Europe has beheld was presented at the city of Moscow. I leave to poets and word-painters the description of the scene. It was the coronation of the Tsar. Its significance for us is found not in its attendant splendor, but in its enunciation throughout of the fundamental principle of Russian government. Though the gorgeous rites continued for hours, the culmination of each ceremony, whether prayer or promise or benediction, was always some fresh assertion or acknowledgment of autocracy. The Metropolitan of Moscow, having bestowed the orb and scepter on the new sovereign, concluded his prayer of consecration with the words, "The Lord . . . preserve with His protection the established rule." In the profound silence the kneeling Tsar exclaimed, "Lord God of my fathers, Thou hast elected me to be ruler of this Thy people." Last act of all, the Metropolitan of St Petersburg announced, "God hath crowned this God-given, God-adorned, most God-fearing autocrat . . . Emperor of all the Russias." And then, turning to the Tsar, he said, "Take thyself the scepter and orb of the Empire, the visible image of the sole sovereignty over the people given by the Most High for their government, promotion, and every desirable well-being." The Tsar took no oath of obligation like that so many times repeated from the steps of our National Capitol. He made no promise. He simply accepted the burden placed upon his shoulders. That burden is "sole sovereignty over the people."

He personifies the theory of the father who never grows old and never dies, and whose national family is made up of children who never reach maturity and are always young. A few weeks ago at Tsarkoe Selo the Tsar received the deputation of workmen. As they talked of him in the vestibule the only name by which they called him was "The Little Father." They were grizzly veterans of labor, horny-handed by years of toil, and he a stripling, but to them the little father. When ushered into his presence, the first words they heard from his lips were "My children." Despite the difference in years, they were children around their father's feet.

That is the attitude of the Russian Slavs toward their autocratic head. Such an idea of governmental paternalism is absolutely contrary to our own, nor can it be appreciated or credited except as one acknowledges the essential difference of race accentuated by history and environment. When discussing the French we are talking about a Celto-Latin race; when the Germans, a Teutonic race; when the United States of America, a cosmopolitan race, a mingling of all the peoples; when the Russians, a Slavic race, a stock distinct from every other European race. From its very cradle, through the more than thousand years since, the Russian branch of the Slavic race is, in whatever pertains to government, the direct antithesis of our own. It is as difficult for the average Russian to appreciate our modern, twentieth-century sentiment as it is for us to appreciate their docile, submissive sentiment, which has been wrought out in the interminable forest and steppe.

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* The Tsar's proclamation of religious freedom and equality, issued on April 30 and received with enthusiasm by the European and American world, is probably most unwelcome to the great majority of his subjects. It seems almost irony that this noble message of religious progress will especially benefit the Rascolniki, or Old Believers, the dissenters or sect reactionary even for Russia and bitterly hostile to all western influence and to all attendant progress.

THE TSAR AS THE POLITICAL HEAD

So the Tsar is the all-controlling, all-comprehending political unit. He is the legislative, the executive, the judicial. His authority extends over 8,500,000 square miles and 150,000,000 people. He cannot know the needs of all nor can he reach in relief to all. Consequently he summons to his service advisory boards, on whose intelligence and loyalty he must depend. There is the Ruling Senate — Pravitelstvuyushchiy Senat—established in 1710 by Peter the Great. It is divided into six sections, each presided over by a lawyer of eminence, who represents the Tsar. The sections are at once courts of justice and examining boards. In behalf of the Tsar the Senate promulgates the laws. There is the Council of State, purely consultative, organized in 1801 by Alexander I and reorganized on broader lines four years ago. It examines proposed laws and discusses the budget. It is divided into four departments, devoted respectively to legislation, to civil and ecclesiastical administration, to economy and industry, and to commerce and sciences. There is the Committee of Ministers, varying, like the Cabinet of Great Britain, in number and office, and, moreover, including several high functionaries and Grand Dukes. There is the Holy Synod, which superintends the religious affairs. The great metropolitans and bishops compose it, but its decisions have force only as approved by the Tsar and are issued in his name. There are several so-called cabinets, mainly philanthropic or economic. There are the 78 governors general, one over each province of the Empire, and 792 administrative councils, one for each provincial district. The members of all these different Imperial boards, of whatever name or dignity, are responsible to the Tsar.

THE VILLAGE MIR

The Tsar may be called the infinite unit. In Russia there is another or an atomic unit, just as real, but in comparison infinitely small. This is the mir. None the less *mir* is the most important word in the Russian language. It means the village and the village assembly. To the mind of the peasant it means the world. European Russia is made up of 107,676 communes or villages. Each is and has its mir. As in national affairs the Tsar decides or acts through his senate or council or synod, so in local affairs the mir acts for him. Apart from affairs of state, in the mir the peasant has a political existence of his own. Over the mir, in much akin to the town meeting of New England, presides the starosta, elected by it. Several communes united compose a volost or canton, of which there are 10,530 in European Russia. To the cantonal and provisional assemblies, each composed of duly elected delegates, is applied the name, of late become so familiar, of the zemtsvo. The mir or volost decides all questions of local nature, such as concern roads, schools, health, justice, and acts as a peasants' court in cases not involving more than 60 dollars. But

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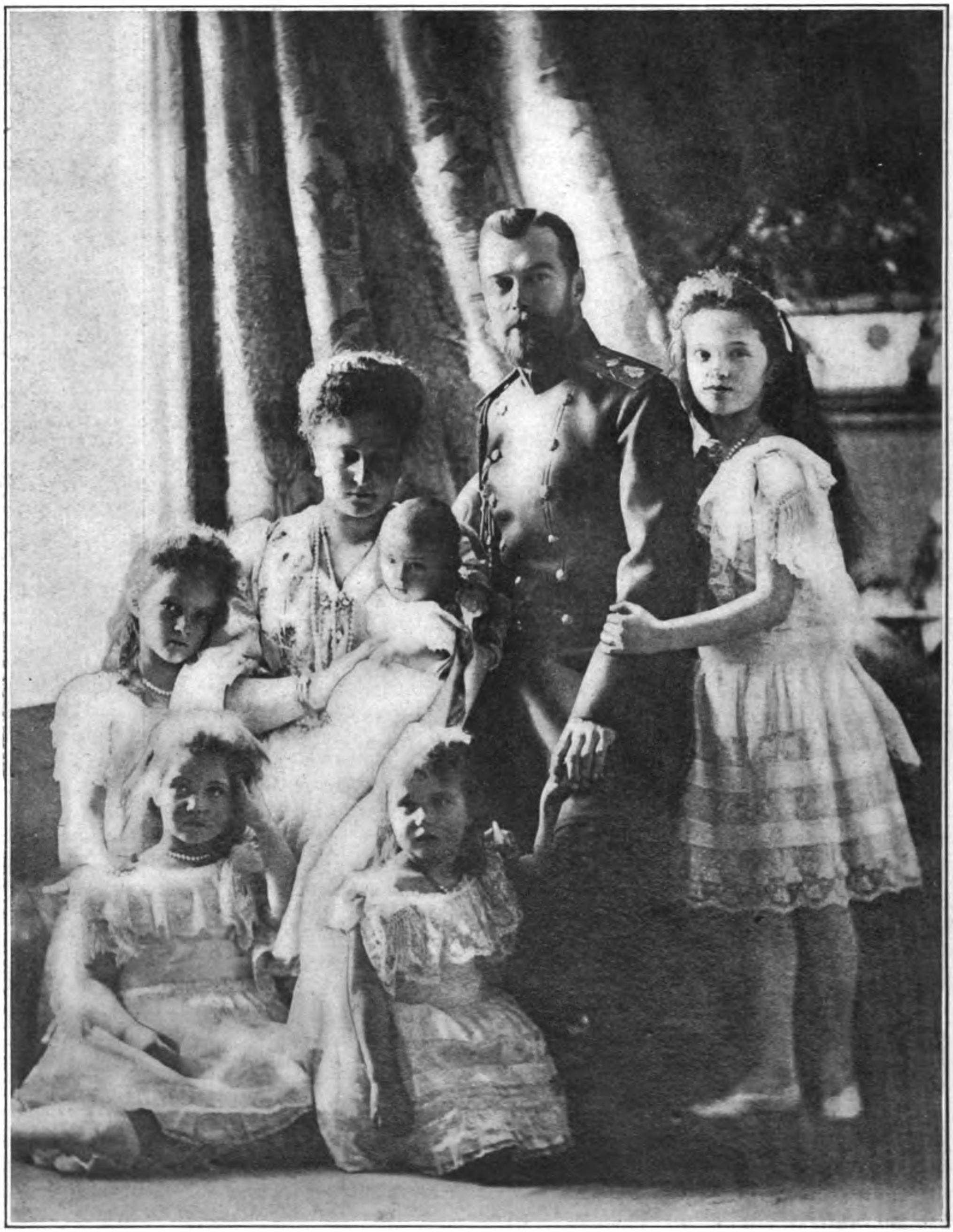
The Tsar and Tsarina at Home

over every act or meeting impends the shadow of the Tsar. His delegate or commissioner is always near and may, though he seldom does, reverse all the proceedings. Thus autocracy stands forth alike in the lowly mir or in the Imperial Senate. Not far astray is the Slavic proverb, "In Russia two are everywhere, God and the Tsar."

This system is not the result of usurpation by violence or fraud. The process of its evolution and corresponding sanction is to be read on every page of Russian history.

THE EARLY RULERS OF RUSSIA—THE RURIKS

The first articulate cry of Russia was a prayer for a ruler. The Russian Nestor tells the story. In 862, one thousand and forty-three years ago, in their first assembly, the Russians said, "Let



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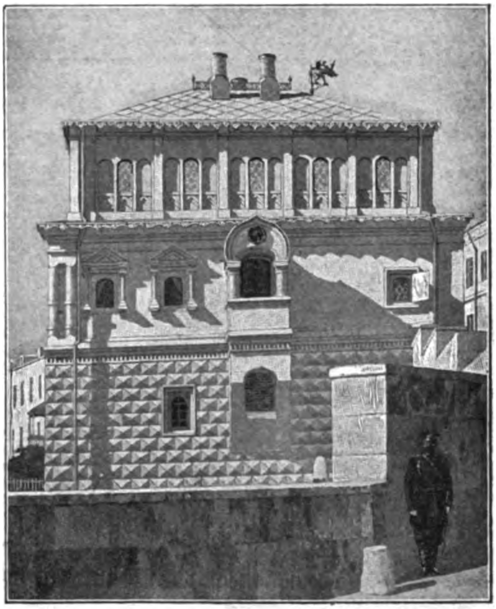
Latest Picture of the Tsar of all the Russias and His Interesting Family, including Baby Tsarevitch us search for a prince who will govern us." They decided on a foreigner, the Norman Rurik. To him and to his brothers they sent messengers to say, "Our country is large and abundant, but order and justice are lacking. Come and take possession of it and rule over us." It would be difficult to recall a similar instance in any other country. Rurik vouchsafed a favorable reply, and founded the first Russian dynasty.

A hundred years later the sovereign, Wladimir, then a pagan, became a Christian. At Kief he ordered his subjects to assemble on the banks of the River Dnieper and be baptized. They joyfully obeyed. "If baptism were not good," said they, "our prince and our boyars would not have submitted to it."

The common formula of a royal order was, until the time of Russia's subjugation by the Tatars, "This is my will, and hence the law. Hear and obey."

From 1205 to 1472 the country groaned under the merciless sway of the Mongol Tatars. Resistance was of no avail against the overwhelming numbers of the invading horde. The period is fitly called in Russian history "The Age of Tears" or "The Age of Woe." No other country of Europe has ever been subjected to such horrible and long-continued suffering. The only alleviation to the awful distress was found in the efforts of the royal Russian family—itself tributary and a vassal, always weak, but determined and shrewd—to modify the ferocity of the conquerors and to keep the sense of nationality from dying. Upon their princes, fellow-sufferers with them in a common and intolerable subjection, the people looked as their only hope. When at last Prince Demetrius of the Don won a decisive victory over the horde and made it evident that its final expulsion was only the work of patience and time, the delirious gratitude of the people knew no bounds. They were ready to swear themselves the subjects of Demetrius and his heirs forever. The city from which the deliverance had proceeded was henceforth "Holy Mother Moscow." Autocracy, by its immense services, had enshrined itself in the Russian heart. Gradually the broken horde was pressed back to the waste lands which stretch along the Azoff and the Caspian, nor is it strange if subjection through 273 hideous years to inhuman Asiatic masters left traces, hard to eradicate, upon Russian character.



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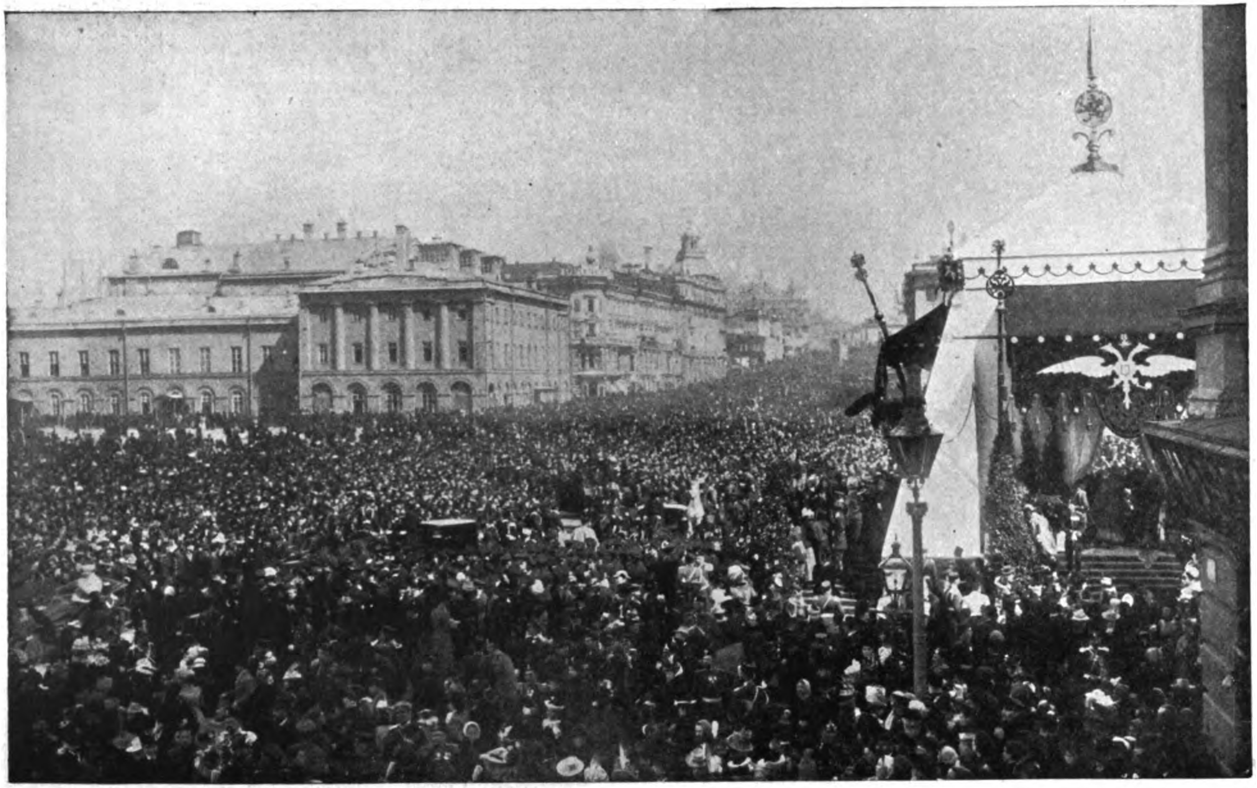
Home of Romanoffs, Moscow

From 1462 to 1584 three princes occupied the throne—Ivan III the Great, Wassili, and Ivan IV the Terrible, or, more accurately rendering the Russian adjective, Ivan the Awful. Ruthless, sometimes monstrous, but always mighty, always persistent in one purpose, these three built up Russia from its humiliation and weakness into glory and strength. Before Ivan IV, the marvelous madman, died he had made him-



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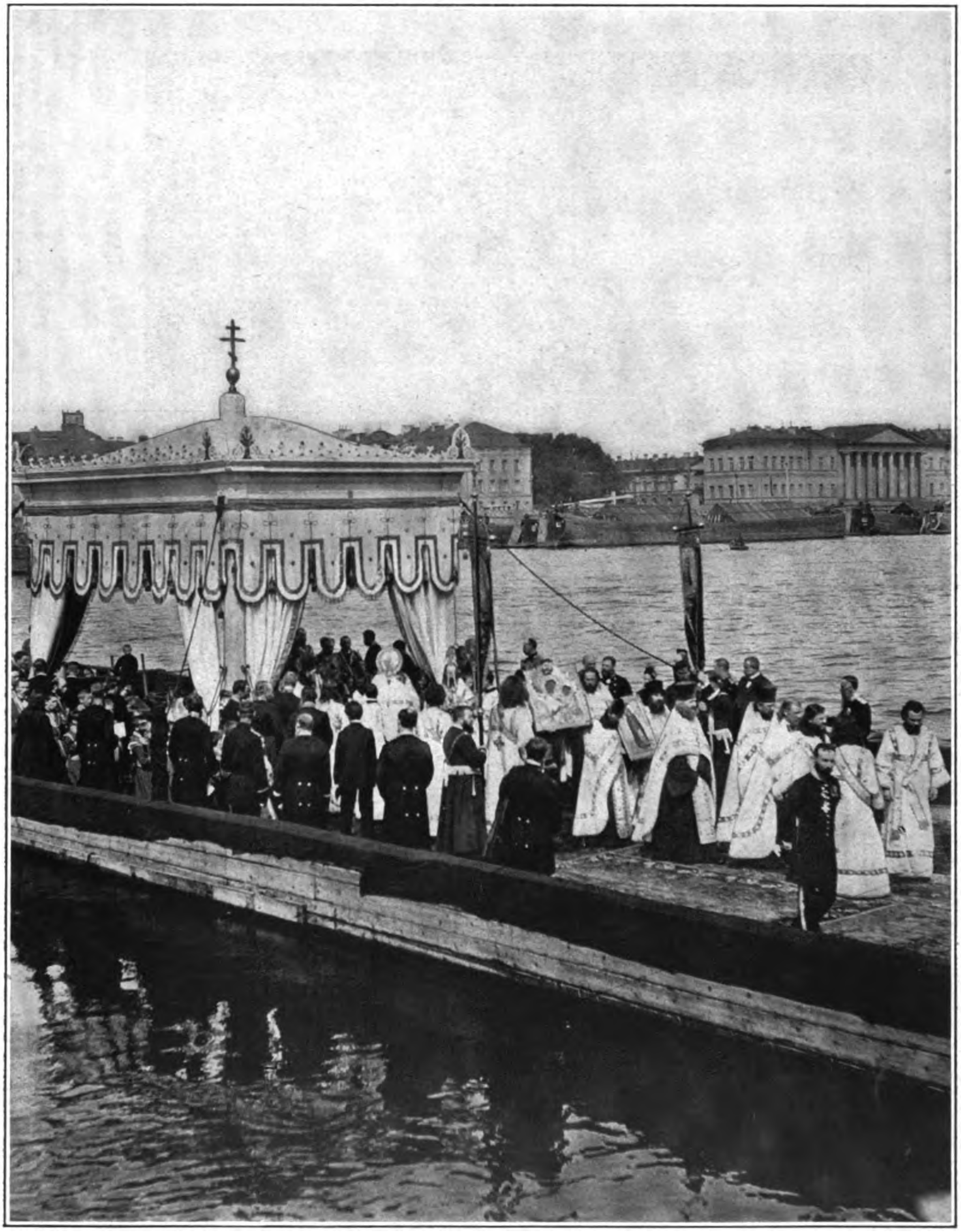
A Crowd in Theater Square, Moscow



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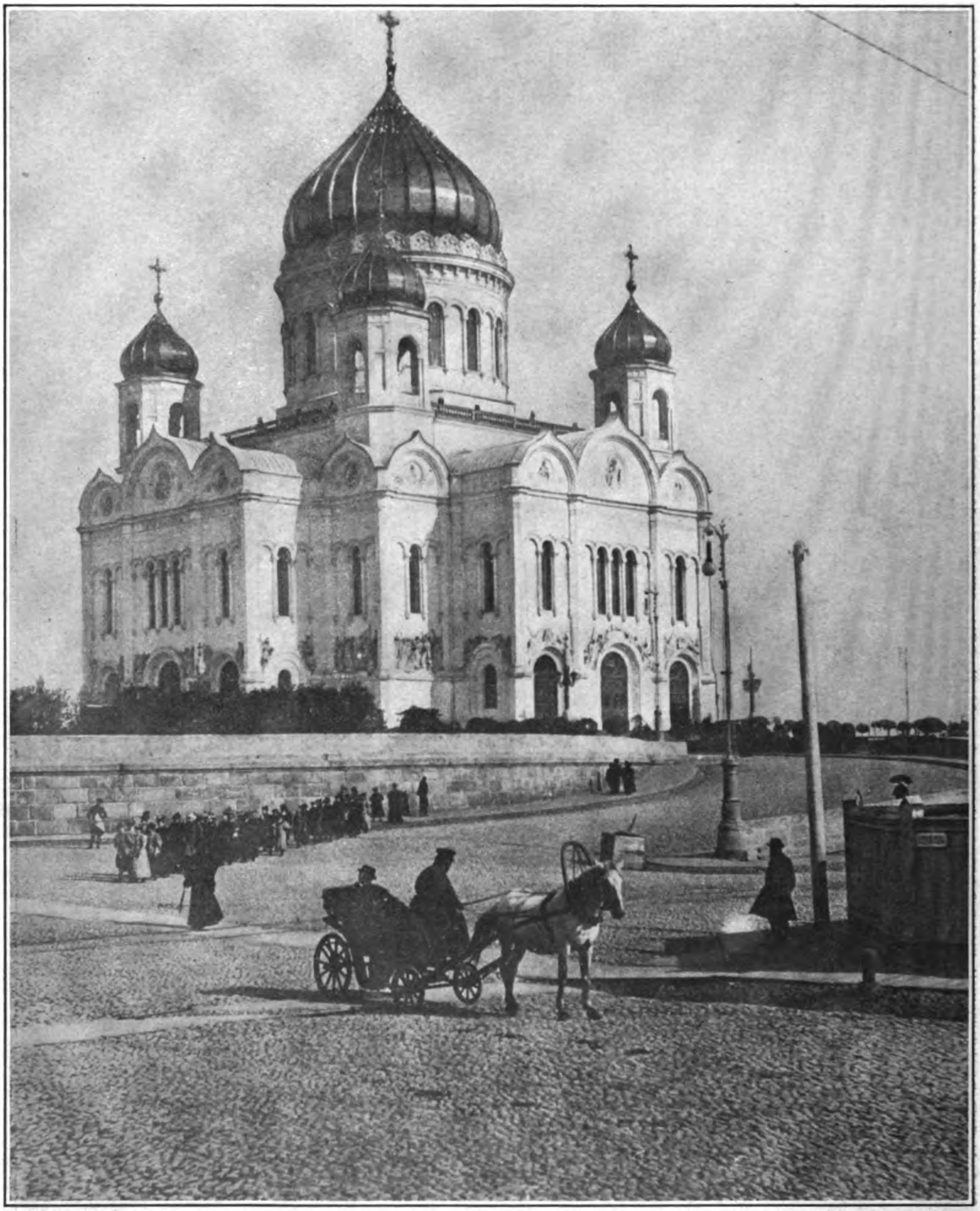
Priests of the Orthodox Greek Church on a Float upon the Neva River, St Petersburg

Blessing the waters to make them safe for drinking. The ikons or sacred pictures are indsipensable to this ceremony



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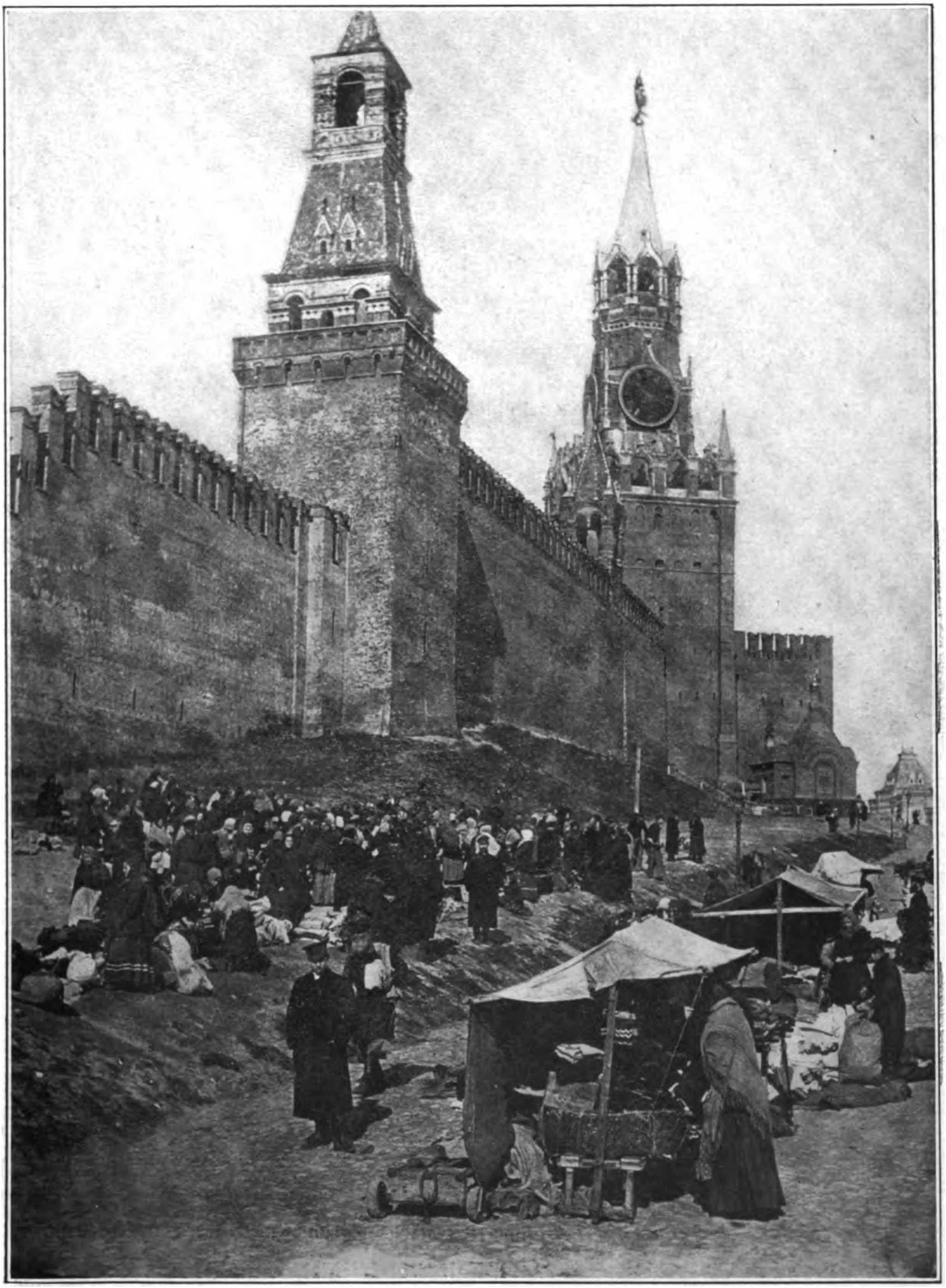
Splendid Temple of Our Saviour in a Western District of Moscow

Built to commemorate the disastrous failure of Napoleon's attempt to conquer the Czar's empire. Seven thousand people attend mass at one time under the dome, which is covered with pure gold. The gilding of the five domes alone cost nearly a million dollars. The procession is a party of school girls coming from the church guarded by a vigilant chaperone.



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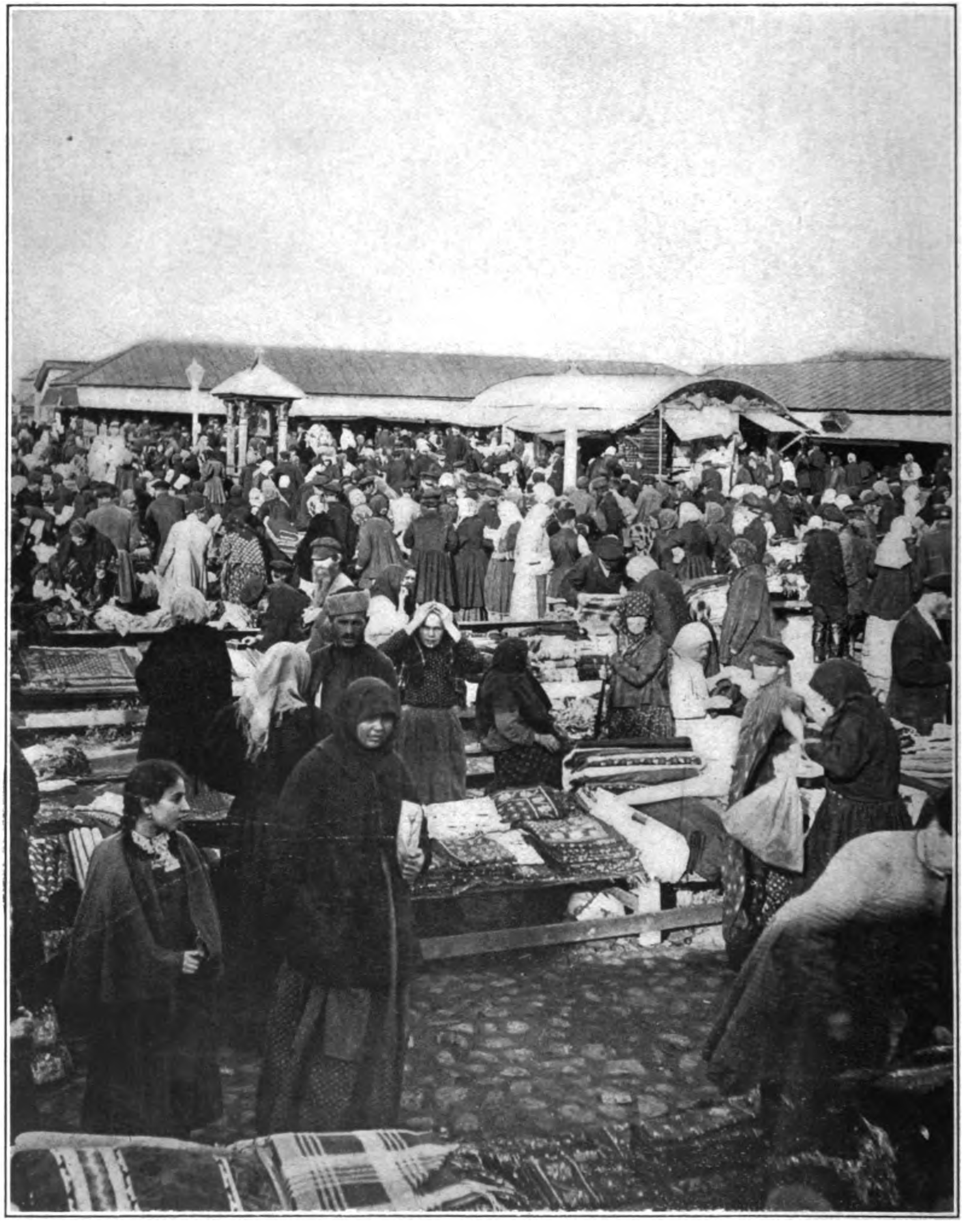
Old Defenses of the Kremlin—the Citadel of Moscow

These walls have withstood many mediæval sieges, but would fall at once if modern artillery or bombs attacked them. The clock tower marks the sacred Gate of the Redeemer, where the orthodox Russian removes his hat in reverence for a miracle-working picture of the Saviour.



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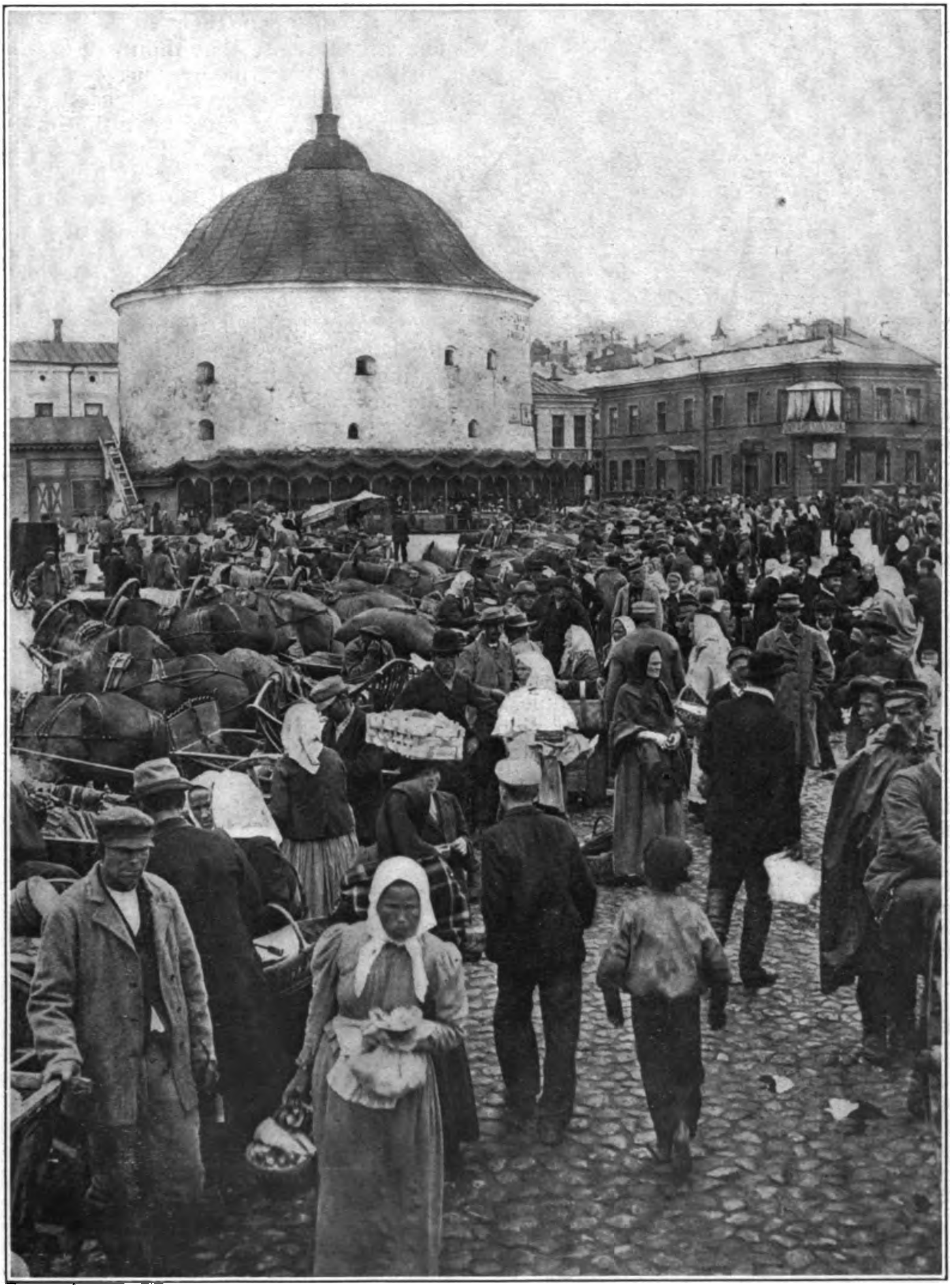
Russian Cloth Market in "the Fair" of Nijni-Novgorod, Russia



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The Market Place, Viborg, Finland

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Old St Petersburg

self a "god in the minds of his people." Autocracy had received a fresh sanction in their absolute and whole-hearted submission.

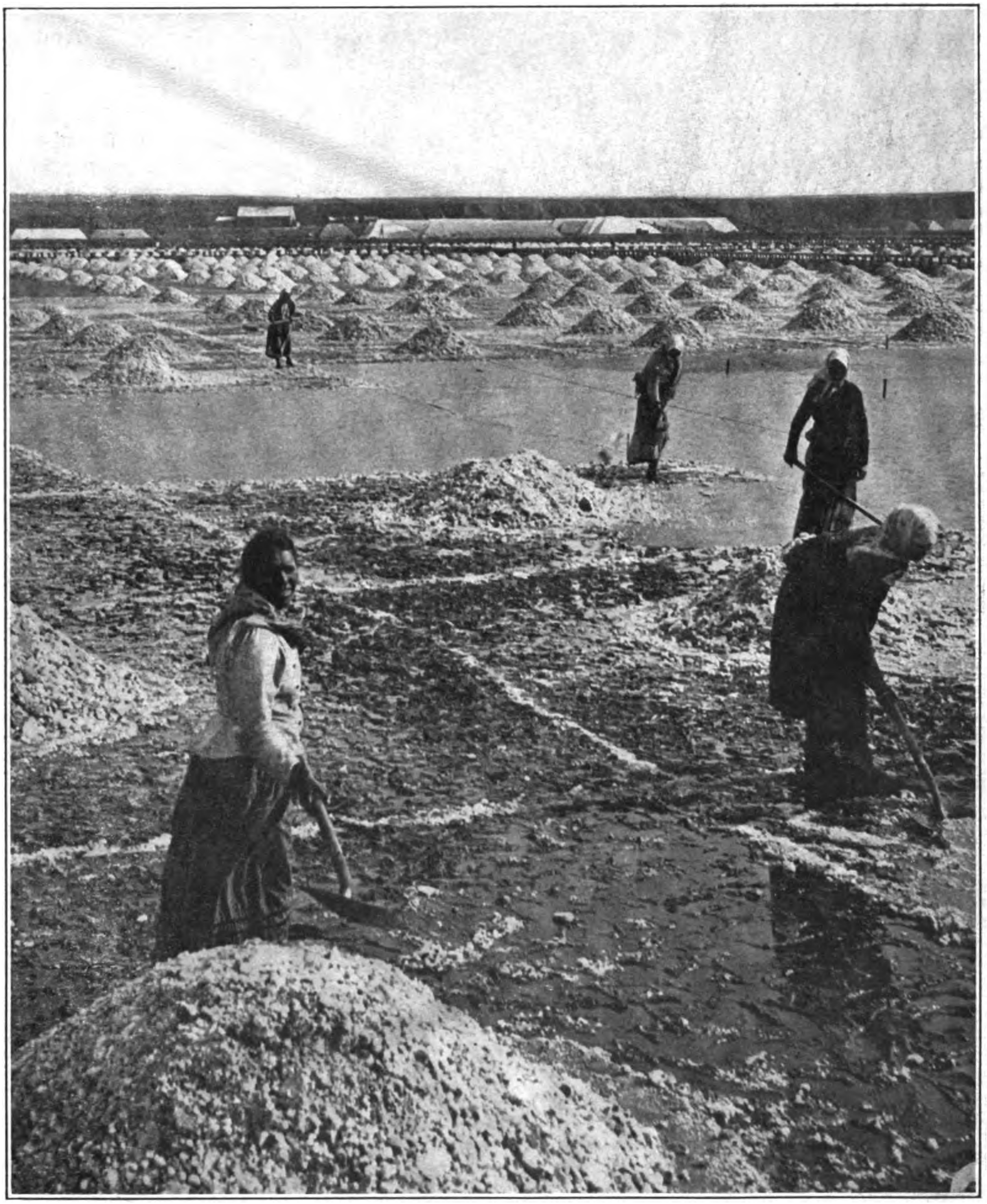
THE FIRST OF THE ROMANOFFS—MICHAEL, A BOY OF 17—IS ELECTED RULER

Suddenly the boy prince, Demetrius, the last heir of Ivan, died. With him the royal line of Rurik became extinct. There followed thirty years of lawlessness and anarchy, of disastrous civil and foreign war. At last, in 1613, a great assembly, made up from every rank and class in Russia, got together in Moscow. A national assembly, equally representative of a nation, neither Russia nor Europe had ever seen. This assembly, after long and fierce contention, chose Michael Romanoff as Tsar. Not a single condition did they impose upon that untried boy of seventeen thus unanimously elected ruler. When he appeared before them, upon their knees they shouted, "Promise that thou wilt graciously consent to rule over us." And so with autocratic power the dynasty of the Romanoffs was seated upon the Imperial Russian throne. There is no other royal house reigning in Europe today which in equal degree owes its elevation to the free voice of the people. There is no other reigning house that does not trace its origin back to some successful warrior and owe its earliest advancement to the sword. In every other country, on some bloody plain, a Hastings or a Marchfield, William the Conqueror, the Hapsburghs, the Hohenzollerns, have carved for themselves and their descendants a title to the crown. The father of Michael Romanoff was no brilliant soldier, only a faithful parish priest, who was renowned for piety and ability, and who because of his noble qualities attained high ecclesiastical distinction.

Upon the autocratic throne, thus broad-based upon the popular will, sovereign succeeded sovereign for more than a century. On each monarch devolved the duty of choosing his heir from among the male or female members of the Imperial family. Always that choice was accepted by the nation. Smallpox caused the sudden death of Peter II, in 1730, before he had expressed any preference as to his successor. There were then living four descendants of Michael Romanoff. Three of them were women—Anna Ivanovna, Catharine Ivanovna, Elizabeth Petrovna—and a male infant a few months old. Eight of the most powerful nobles banded themselves together in what they termed "The High Secret Council." They obtained control of the army and of every department of government and administration.

A CONSTITUTION IS OFFERED

They then offered the crown to Anna Petrovna, subject to the following conditions: (1) The High Council should



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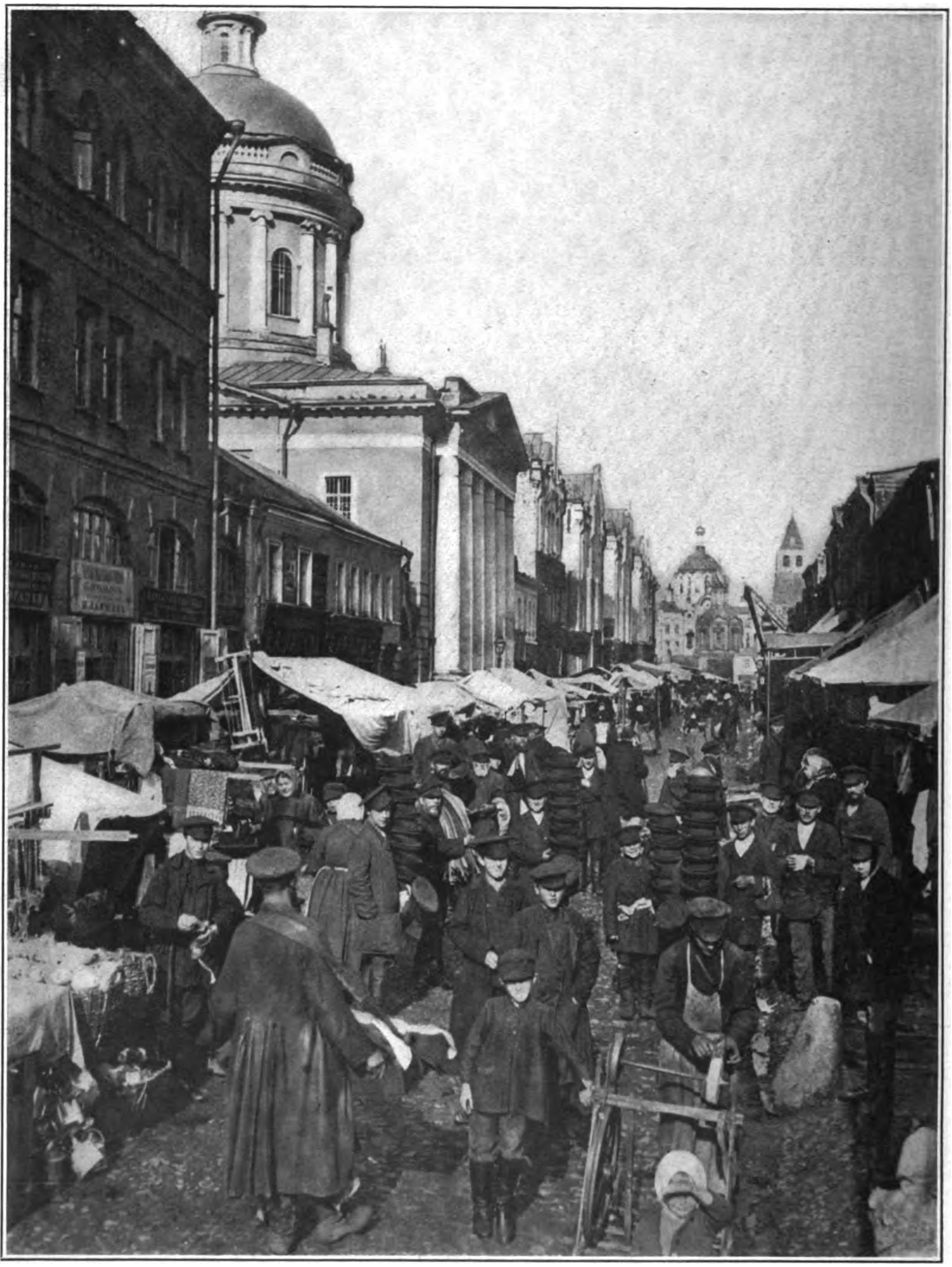
A Reservoir After Evaporation. Turning up the Salt, Salt Fields, Solinen, Russia



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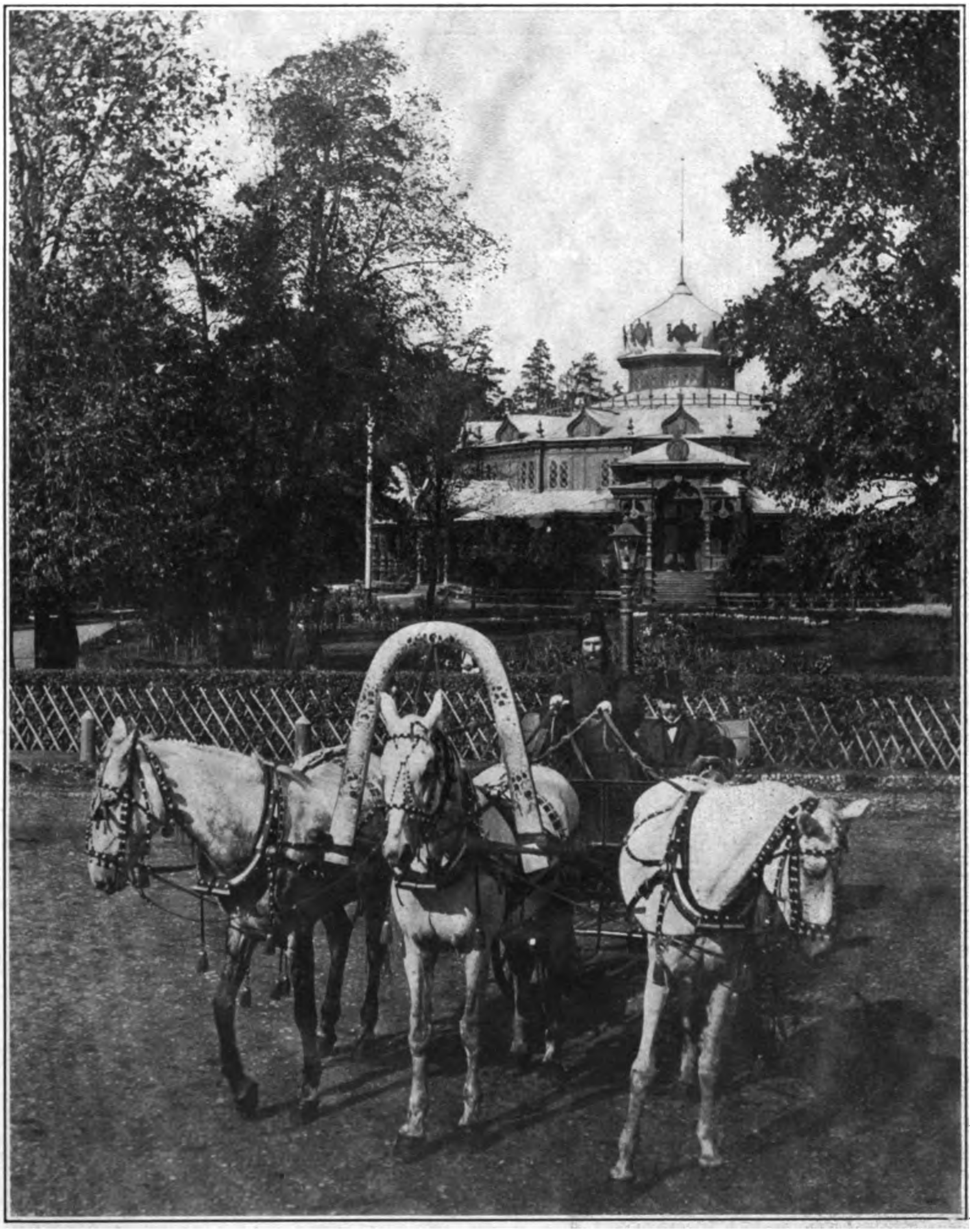
Moscow Workmen in one of the Street Markets



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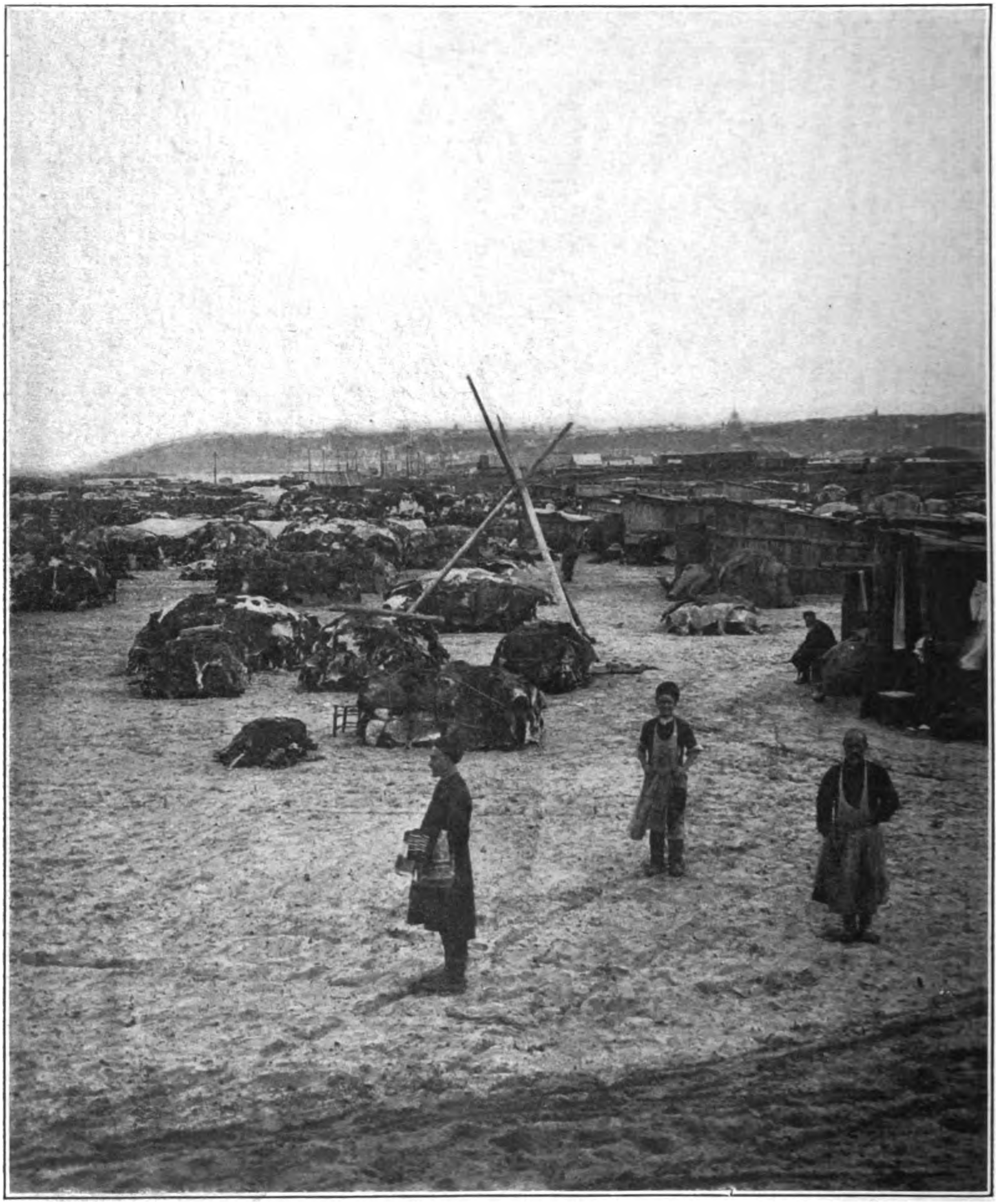
A Characteristic Russian Troika (three-horse carriage) before the Old Petrofski Palace in the Northwest Suburb of Moscow

The Palace is not now occupied as a royal residence



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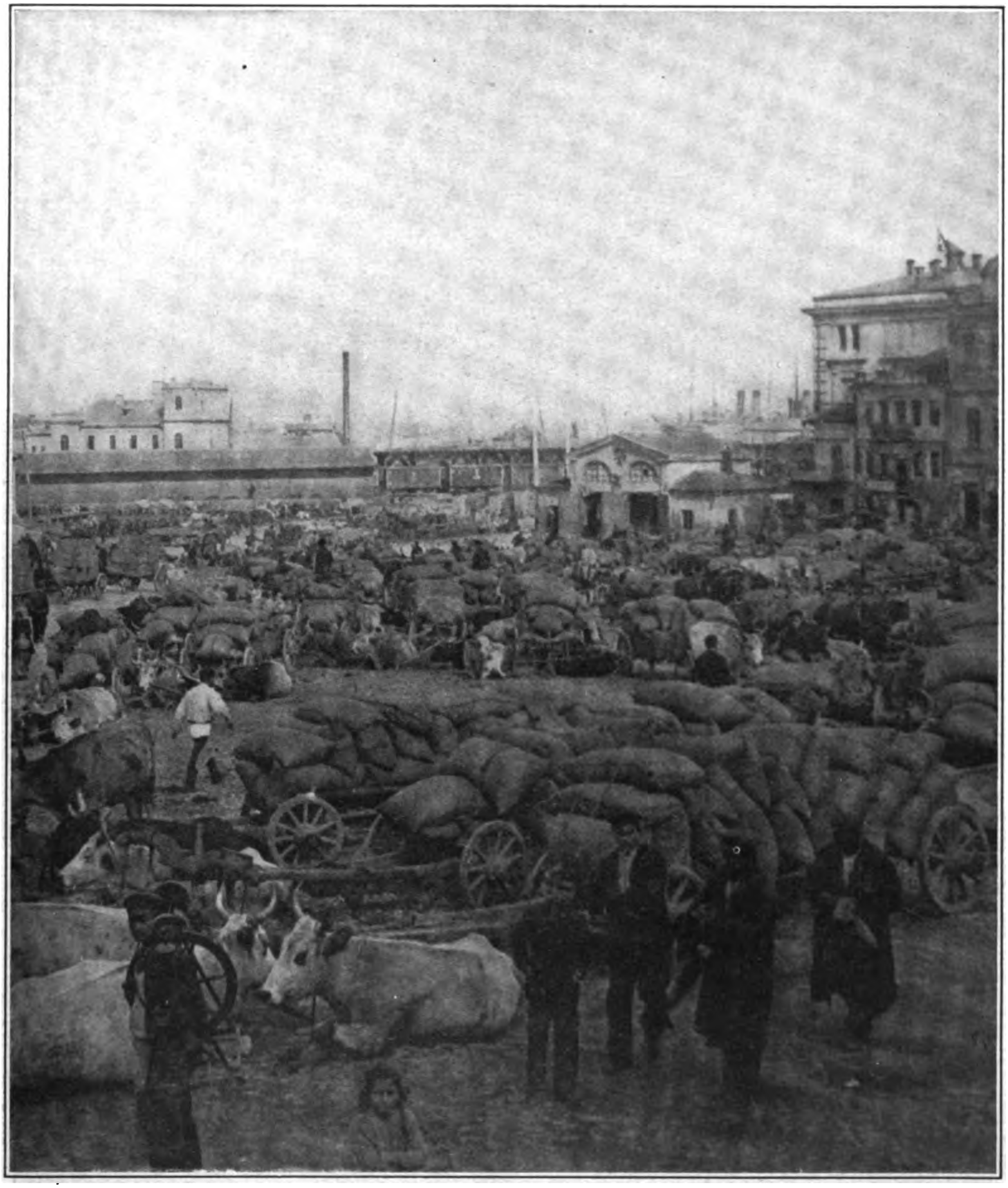
Siberian Hides and Village of the Tartars, Nijni-Novgorod, Russia



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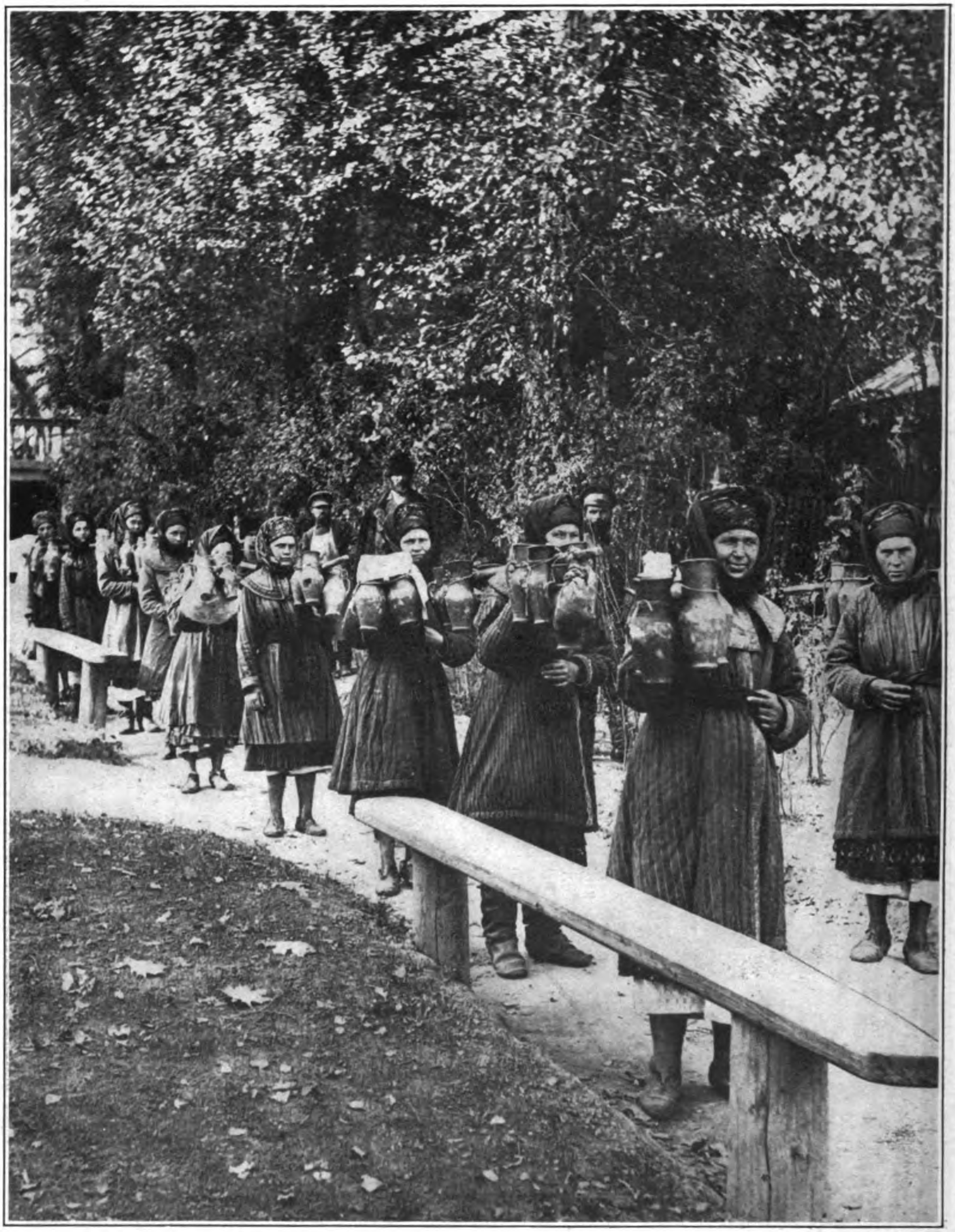
Wheat for Export at Russia's Great Southern Seaport, Odessa



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Country Women Tramping into Krief, Russia, with the Morning Supply of Milk

An enormous weight is carried uncomplainingly with the help of the pall over the shoulders to which the milk-jars are attached. These women do the heaviest part of the farm work, milking at daybreak or earlier, and often walking five or six miles to deliver their wares. Very few of them can read or write, and they are helpless under the domination of the priests and village head-men.

be a permanent body, self-perpetuating, and should be consulted by the Tsarina in all state affairs. (2) Without the consent of the council the Tsarina should make neither peace nor war, should levy no taxes, should alienate no public territory, and should appoint no public official of higher rank than colonel. (3) No member of the nobility should be executed or condemned, and no property of a noble should be confiscated except after a fair trial by his peers. (4) The Tsarina should neither marry nor appoint a successor without the consent of the council. (5) Violation by the Tsarina of any of the aforesaid stipulations should constitute forfeiture of the crown. Anna accepted all these conditions, solemnly signed the document, and was then proclaimed Tsarina or Empress of Russia.

Magna Charta, with all its sublime provisions, seemed thus naturalized upon Russian soil. The *homo liber* of the Norman Latin in the English charter meant practically the same as the word *tchin*, or noble, in the paper of the High Secret Council. So from the banks of the Thames Runnymead had been transplanted to the banks of the Neva. The 24 Norman barons who forced the submission of King John lived again, 515 years after, in the eight Russian lords who had secured the acquiescence of Anna. Inviolability of person and property, *habeas corpus*, trial by jury, hitherto the monopoly of distant English islanders, were now the guaranteed right of the Slav. The Slavic Empire, no longer autocratic, possessed a constitution.

THE PEOPLE REJECT THE PROFERRED CONSTITUTION AND REFUSE TO LIMIT THE POWERS OF THE TSAR

The announcement of this constitution was received with general indignant protest. Under severe penalties the High Council forbade the people anywhere to assemble; but they could not disperse and silence the crowds which got together all over Russia and denounced the new system. The Tsarina was put under guard and only partisans of the new order allowed to approach her. Thus the council hoped she might be kept ignorant of the mounting tide of popular feeling. Yet the council found itself powerless, despite its being entrenched in possession of the government and despite the rank and wealth and personal influence of its members. On February 25, 1731, a zemski sobor, a national assembly, dared to convene in Moscow. The eight hundred elected deputies belonged to the nobility, the clergy, the professions and trades, and the peasant class. They drew up a formal and unanimous protest against the constitution. The Tsarina entered the hall and was greeted with frenzied shouts, "We will not let laws limit our Tsarina!" "Let our Tsarina be an autocrat just like her predecessors!" The Tsarina calmed the tumult and adjourned the meeting. At the next session a formal petition was voted by the eight hundred for the reëstablishment of autocracy. The council melted away. Autocracy reigned again as in all the days since the time of Rurik. Thus ended the first, if not the only, genuine attempt at a liberal government in the Muscovite Empire. This is the most important, the most significant, event in the history of Russia.

Through another century successive sovereigns sat upon the autocratic throne. In 1822 the childless Alexander I was Tsar. His brother, the Grand Duke Constantine, had been acknowledged as heir. Constantine desired to marry the Polish girl Jane Grodzinska. Because she was of humble origin, a Catholic, and a Pole, Alexander could not tolerate his brother's choice as the future Tsarina. Between the maiden and the throne Constantine was compelled to choose. To him her love was dearer than the Imperial crown. He solemnly renounced his rights as heir apparent in favor of his younger brother, Nicolas. This renunciation was known only to Alexander and their mother, the Dowager Empress Maria, and kept secret even from Nicolas himself. Two years later Alexander died. Then ensued between the two surviving brothers a contest almost without parallel. Constantine, then governor of Poland, ordered the troops at Warsaw to swear allegiance to Nicolas. Nicolas at St Petersburg ordered the troops throughout Russia to swear allegiance to Constantine. The fraternal rivalry continued for three weeks. It was ended only by the solemn declaration of Constantine that he had once renounced the succession, and that nothing could induce him to go back upon his word.

Constantine was the older. Moreover, he was a soldier and the idol of the army, which had been determined to enthrone him against his will. Nicholas was a younger brother and almost unknown. There then existed in the country two secret organizations—the Society of the North and the Society of the South—both imbued with the ideas of the French Revolution and hostile to the autocracy. By them the devotion of the masses to the principle of legitimacy was cunningly made to serve an attempt at revolution. Some of the colonels at the capital, though favorable to Constantine, were inclined to this liberal party. Those officers ordered their men to shout, "Long live Constantine" and "Long live the Constitution" (Constitutza)! "Who is this Constitutza?" asked the puzzled soldiers. "Long live Constitutza! She must be Constantine's wife." One colonel cried, "Long live the Republic!" The soldiers said, "Who is Republic? That is not the name of the Tsar." The colonel replied that it was the sort of government they were going to set up and that there would not be any Tsar in it. "Oh," said the soldiers, "then it isn't the right thing for Russia. We have got to have a Tsar." And they themselves arrested the colonel.

Nicolas I, his son Alexander II, his son Alexander III, his son Nicolas II, the present Tsar, such is the succession since that time to the present hour.

It is not unusual to speak of these men as irresponsible autocrats and to regard the Russian system as an irresponsible autocracy. But an irresponsible autocrat never has held the scepter, and irresponsible autocracy never has existed, even in phlegmatic Russia.

An irresponsible autocrat among people of Indo-European stock is an utter impossibility. Each autocrat is weighed in the balances and judged—if need be punished—by those over whom he reigns. This judgment no Russian autocrat from the accession of Michael Romanoff has escaped. The kindly, well-intentioned, feeble, self-contradictory, ill-starred Nicolas II is being weighed in that balance now. Your judgment and mine, the judgment of foreigners or of posterity, will concern or affect him little. But long-suffering, patient, little exacting as the Russian people are, they are inexorable as fate, merciless as doom once their judgment made.

The dumb popular heart makes no harsh or hard demand upon its sovereigns. It asks that the autocrat shall be profoundly Russian, Russian in feeling and sympathy, in orthodoxy and faith, in fidelity to old tradition, in heart-whole devotion to her whom the peasant reverently calls "Holy Russia." It asks that he shall develop the national resources and augment the national strength; that he shall increase the national territory and maintain the prestige of the national arms; that he shall keep Russia's name glorious. This is not too much to require of him to whom the nation has intrusted its all.

THE GENERAL CHARACTER OF THE TSARS

When Peter III, unnatural and debauched, drank in his orgies to the success of foreign troops and gloated over disasters to his own; when Paul, cynic and half mad, flouted the church and betrayed the national cause, the cup of wrath was full. It matters little that the executioners who struck them down were self-appointed, and, no better than hired assassins, held no mandate for regicide. In the line of Russian autocrats those two stand out with a shameful preëminence.

Not all the sovereigns since Michael Romanoff have been great. More than one has been deficient in private virtue. In some there flowed not a drop of Slavic blood. But they all bore the test of being supremely Russian, only Russian, at the core. Save the execrated two, each down to the accession of Nicolas II, in 1894, contributed his full share to Russian power and prestige, both at home and abroad. Like the concentric rings of an oak tree were the territorial accretions of the Russian Empire. Each larger ring indicated a later reign.

In other lands there have been other autocrats, but always alike in this: each has fallen or stood according to his ultimate military failure or success.

Had the mass of the people on whom his power rested really desired equal rights and personal liberty and self-government, the autocrat would not have been tolerated for an hour. The foremost autocrat of all time is the great Napoleon, child of the French Revolution.

> "He was a despot—granted!
> But the avtos of his autocratic mouth
> Said yea i' the people's French; he magnified
> The image of the freedom he denied:
>
> And if they asked for rights, he made reply,
> 'Ye have my glory!' and so, drawing round them
> His ample purple, glorified and bound them
> In an embrace that seemed identity.
> He ruled them like a tyrant—true! but none
> Were ruled like slaves: each felt Napoleon."

Thus was it while Marengo, and Austerlitz, and Jena, and Friedland, and Wagram studded like stars his victorious name. The march to Moscow, the retreat from Leipsic, the catastrophe at Waterloo, could have no other meaning than St Helena.

Since February 6, 1904, the on-looking world has beheld an unexampled spectacle. It has seen Russia staggering under such humiliation from a foe, once despised, as no other European nation ever endured at the hand of an Asiatic. In the monotonous story of a dozen months there is not a single alleviating feature to salve Russian pride except the admirable working of the trans-Siberian railway and the stolid, unbroken valor with which the Russian soldier has faced continuous defeat.

The diplomacy of Russia, before and during the war, has been as deplorable as her generalship. Her state papers, whether in the form of protests or of communication with other powers, have been querulous and almost puerile. Her wily and unscrupulous enemy, equipped with all the appliances of the West and all the subtlety of the East, has so excelled at every point as to render haughty Russia an object of pity and derision.

All this detail the common Russian does not know. He does know that, despite hundreds of millions lavished and thousands of men sacrificed, the blackness has not been relieved by a single victory, and that the total has been defeat, retreat, and surrender. The dull ache of unspeakable humiliation is in his soul. Marvelous is it that in fury, blind as Samson's, the whole nation has not already risen as one man to pull down the pillars of the state. Strikes and riots there have been, and massacres by infuriated men, but neither revolution nor rebellion, no universal outburst commensurate with the hideous tragedy in the East.

There are many voices, but, as in the crowd before the temple, some cry one thing and some another. The only audible sounds breathe indignation and rage.

Now there has come a temporary hush. For a time the gaze is diverted to that forlorn squadron plowing its uncertain way through unknown and treacherous waters. One signal victory of Rodjestvensky's fleet may reverse all that has gone before, retrieve all the battles lost, redeem autocracy and the Tsar. In the anguish of suspense the autocrat and the nation listen and wait.

THE PRESENT TSAR

Upon a train some days ago I sat near two gentlemen engaged in earnest conversation. They were talking about a third, apparently a friend of their youth. They seemed to be summing up his life and character. Said one, "He was always hampered by his inheritance." Said the other, "Well, I think he blundered along just as well as he knew how." Then I caught another sentence, "He never knew whom he was able to trust." Their conversation ended with, "He would have been a great deal happier if he had been a clerk in New York." Despite the distance in race and rank, those random remarks epitomize the life story of Nicolas II.

Far happier for him a simple house in Yonkers or Harlem than the sumptuous halls of the Winter Palace. Better fitted is he for the routine of an office and a desk than for the perils and responsibilities of a crown. Then, when the day's work is done, what joy to reach his home and toss his children in his arms, and picnic on a holiday or a Sunday in the suburbs with his family. Such, they tell us, is the gentle, homely, wife-loving nature of the present Tsar. Whatever the destiny of the autocrat and of the autocracy, the Russian people remain. Rudyard Kipling, in "The Man Who Was"—perhaps the most powerful story Kipling ever wrote—puts upon the lips of Dirkovitch the prophecy of that for which the centuries have been waiting: "The Czar! Posh! I snap my fingers—I snap my fingers at him. Do I believe in him? No! But the Slav who has done nothing, *him* I believe. Seventy—how much?—millions that have done nothing—not one thing. Napoleon was an episode! . . . Hear you, old peoples, we have done nothing in the world—out here. All our work is to do: and it shall be done, old peoples. Get away! Seventy millions—get away, you old people!" *

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* Some good books on Russia are:

"Greater Russia." Wirt Gerrare. Macmillan Co. 1904. Several chapters deal with Russia, but the larger portion of the work relates to Siberia and the Amur territory. $3.00.

"All the Russias." Henry Norman. Charles Scribner's Sons. 1902. A very satisfactory account of the resources and general administration of Russia. $4.00.

"The Great Siberian Railway." M. M. Shoemaker. G. P. Putnam's Sons. 1903.

"Russia." Sir D. M. Wallace. Henry Holt. $2.00. The best general account of Russia in the English language.

"Russia in Asia, 1558-1899." A. S. Krausse. Henry Holt. 1899. $4.00. A history of Russian advance across Asia.

"Story of Russia." W. R. Morfill. G. P. Putnam's Sons. 1890. (Story of Nations' series.) $1.50.

"The Russian Advance." A. J. Beveridge. Harper Bros. 1903. $2.50. A graphic portrayal of the causes of the sweep of Russia across Asia.

THE PURPOSE OF THE ANGLO-JAPANESE ALLIANCE*

BY HON. EKI HIOKI

FIRST SECRETARY OF THE JAPANESE LEGATION

NO Japanese need feel himself among strangers when he addresses a British or American audience, excepting for the language that he has to use, and in talking to a gathering of Englishmen living in America he doubly feels among friends. We of Japan realize how much we owe to the great Anglo-Saxon nations, how much they have taught us, and how much we have still to learn from them. Some of your English writers have called us "the English of the Orient," and it was an American who termed Japanese "the Yankees of the Far East." We have not as yet progressed so far on the road to Yankeedom as to be able to sell you gentlemen of Boston wooden nutmegs, but we are still young in the ways of modern civilization. Give us time and there is hope we may even teach Connecticut a thing or two.

Having the honor to be with you tonight—inadequately taking the place of His Majesty's minister plenipotentiary, whose health unfortunately makes it impossible for him to be present, greatly to his regret—it is proper for me to express felicitations for this great day, echoing the sentiment deeply imbedded in the bosoms of the fifty millions of His Japanese Majesty's loyal subjects. Nothing would be more out of place, however, than an attempt on my part to dwell upon the significance of the Empire Day before the British audience. Let it suffice to say that the memory of Queen Victoria, that high personage, whose reign distinguishes itself in history not only in point of length, but in the fact that it is so peculiarly coincident with the wonderful tide of general advancement of civilization and material prosperity which has blessed Great Britain and the world in general, may perpetually be preserved in so fitting a manner as is done here tonight by the United British Societies in America.

This is not an occasion for making a long address, but being present here as the representative of Japan and as a guest of Britishers, I feel I cannot let the opportunity pass without saying a few words about that remarkable compact that binds our two countries to the satisfaction of ourselves and to the benefit of the world.

The object of the alliance, as is well known to you, cannot be better explained than by the language of Lord Lansdowne. In his covering and explanatory dispatch to Sir Claude McDonald, British minister at Tokio, Lord Lansdowne wrote: "We have each of us desired that the integrity and independence of the Chinese Empire should be preserved; that there should be no disturbance of the territorial *status quo* either in China or in the adjoining regions; that all nations should within those regions, as well as within the limits of the Chinese Empire, be afforded equal opportunities for the development of their commerce and industry, and that peace should not only be restored, but should for the future be maintained.

"His Majesty's government trusts that the agreement may be found of mutual advantage to the two countries; that it will make for the preservation of peace, and that should peace unfortunately be broken it will have the effect of restricting the area of hostilities."

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* **An address delivered at the Empire Day Banquet given by the United British Societies of Boston, May 24, 1905.**

Here you have in the fewest possible words the spirit that animated Japan no less than Great Britain. Various comments have been made by different writers and statesmen as to the effect of the alliance upon the world. It has been asserted by some newspapers that this alliance is directly responsible for the present war.

Let them say whatever they choose, but a conscientious study of the document itself cannot fail to convince any fair-minded man that these allegations are entirely groundless. The alliance is purely peaceful and defensive. In one of the passages of the dispatch above referred to, Lord Lansdowne said that "we join in entirely disclaiming any aggressive tendencies." But you must observe that the fact which made Great Britain abandon her long cherished traditional pride and policy of "splendid isolation" is in itself a sufficient proof that the situation in the Far East was one of grave danger and demanded unusual precaution. It was evident that Russian aggressions were no mere phantoms, but were terribly real and threatening.

These aggressions mainly called this alliance into existence for the mutual protection of the interests of the signatories, and later forced Japan to take up arms against her colossal neighbor for the defense of her rights and her very existence.

The primary objects of the alliance are the maintenance of the integrity of the Chinese Empire and the maintenance of the open-door policy in China, the policy which was conceived and so ardently advocated by the British statesmen, and which was so skillfully and happily inaugurated as a matter of international concern by one of the foremost statesmen and diplomats of our day—Hon. John Hay—three years before the conclusion of the Anglo-Japanese alliance. In spite of all the adverse criticisms emanating from unfriendly sources, I confidently declare that all the objects of the alliance have been so far nobly and successfully accomplished.

By the recent course of events in the Far East these conditions which imminently menaced the integrity of the Chinese Empire have largely been removed and the ground for the open-door policy has been made firmer. Were it not for the Anglo-Japanese Alliance, the war might have occurred in 1902, when China demanded the evacuation of Manchuria by Russia. It was in fact delayed at least for some time, and the area of hostilities has been quite effectively restricted, since its outbreak, by reason of this alliance, which has in this respect received indirectly a very strong support from the enlightened policy pursued by the United States in reference to China.

To me it appears that the effect of the alliance has given so much satisfaction that, if the language used by the President of the Victorian Club in his invitation to this banquet extended to the Japanese representative expressed the sentiment of the British public—which I believe and hope to be the case—the renewal of that compact after the expiration of the prescribed terms is inevitable.

We are anxious, with Great Britain and the United States, to see China become rich, strong, and self-repecting. We have our own salvation to work out in our own way. We wanted simply to be let alone and to settle the problems that demanded solution. We were not animated by territorial greed or lust of conquest. We preferred the conquest of peace to the victories of war. We know that the Far East has a great future, and the greater the future the better for all the world. Japan could hope to gain nothing by war and had everything to gain by peace. The Anglo-Japanese alliance sought to give no advantage either to Great Britain or to Japan that was not common to all other nations. England, too, always stood for "equal opportunity," for a fair field and no favor, and that is our policy, and it has long been the avowed policy of the United States. The saying, "May the best man win," applies to nations as well as to individuals.

Certainly, neither England nor Japan made this alliance with the hope that it will provoke war. In laying the treaty before the House of Lords, Lord Landsdowne said that it was a guarantee of peace, and so it was regarded by the Japanese statesmen.

I think no further evidence is needed to prove that the alliance was not concluded with the hope that it would lead to war; I think, on the contrary, every fair-minded man must be convinced that both Great Britain and Japan were animated solely and sincerely by the single purpose to preserve peace and give commercial development full sway. And I repeat it to you, gentlemen, with full appreciation of my statement, that the alliance has fulfilled its purpose. It had made for peace as much as it could. There comes a time in the life of every nation, as in the life of every individual, when the nation must choose between duty and its stern responsibilities, or weakly yield to escape obligations and pay the penalty for weakness tenfold. The war now unhappily waging in Manchuria was inevitable. It is a war not of our seeking. It was forced upon us, as I said before, by aggression and arrogance.

I assume you are familiar with the history of the negotiations preceding the outbreak of hostilities, and I feel confident that you can have only reached one conclusion from a study of the facts. You cannot fail to have been impressed by the spirit of forbearance, patience, and absolute fairness displayed by His Majesty's government, and the desire, pushed almost to the extreme limit of generosity, to do everything possible to avoid war. But we should have been unworthy the respect of our friends in England as well as in America, we should have forfeited our own self-respect, if we had permitted our desire for peace to make us play the part of weaklings and surrender our rights and interests because we were not men enough to defend them. We have done what Englishmen would have done. We have done what Americans, Frenchmen, Germans, and even Zulus would have done. Our national existence was at stake. To die in its defense was more honorable than to live and lose all that we hold most precious. It is most fitting to quote as an expression of my own desire what was said by President Roosevelt: "We wish peace; but we wish the peace of justice; the peace of righteousness. We wish it because we think it right, and not because we are afraid."

JAPAN DOES NOT MENACE THE UNITED STATES POLITICALLY OR COMMERCIALLY

The sympathy of America having been so freely expressed in our favor—a sympathy, I beg to assure you, very precious to us and which we shall ever most sacredly cherish—it may appear ungracious for me to take exception to any expressions of American opinion, but I avail myself of this opportunity, knowing that what I say will not be misinterpreted, to correct an erroneous impression. It is quite evident a belief exists that the strength and power of Japan is both a political and commercial menace to the United States. It has been said that Japan dwells with covetous eye on the Philippines and longs for the Pacific Island possessions of the United States. I assure you no serious-minded person in Japan entertains any such thought. Japan has enough to do for many a year to come to develop her own resources, to assist in the regeneration of Korea, to improve the condition of Formosa, to profit by the commercial growth of Manchuria. The Philippines are outside of the sphere of our interest and form no part in our industrial and commercial expansion. Instead of Japan coveting the possessions of the United States in the Pacific, Japan welcomes the United States as a neighbor as tending still further to increase the bonds of friendship that exist between the two countries.

For the same reason that Japan does not menace the United States politically Japan does not threaten the United States commercially. I have seen it stated that Japan will control the markets of China to the injury of American trade; but that is an imaginary fear. There never has been, is not now, or ever will be a strong commercial rivalry between Japan and the United States. Japan sells to China principally seaweeds, salt fish, beche-de-mer and other marine products, mushrooms, ginseng, copper, coal, matches, cotton yarns and fabrics. The United States sells to China flour, kerosene oil, timber, machinery, railway materials, and cotton goods. Where do Japan and the United States come into conflict? Each is supplying China with articles which admit of no competition. Japan is buying a large quantity of flour from the United States. She does not produce kerosene, timber, machinery, and railway materials. The only article in which there can be a possible competition is in cotton goods. In this, however, the competition is in theory rather than in fact. In the first place, Japan does not produce cotton, and therefore all raw material used in the cotton industry is imported from the United States, India, and China. Now, there are five competitors in this line of goods in the Chinese market—Great Britain, the United States, India, Japan, and China. The British and American interests lie principally in cotton fabrics and yarns of the finer quality, and between these two countries there exists competition. The interests of Japan and India lie principally in cotton yarns and fabrics of a coarser kind, while the Chinese interests are similar to those of Japan and India, and there exists competition between these three countries. But between the former two and the latter three there is almost no competition.

Further, a careful study of the result of competition in China shows that instead of one article driving its competitor out of the market, both competitors simultaneously increased their respective sales. The reason for this is that in a vast country like China, where there exists practically an unknown and an inexhaustible market and as yet such a small portion is open to the influence of foreign commerce, the result of competition is always to widen the extent of the market.

Nay, instead of ugly commercial rivalry between Japan and the United States, we shall, I hope, have a peaceful and harmonious trade relation between the two countries. We shall sell to America in increasing quantities products that America needs and does not produce—such as tea and silk—and take from her such articles as are more profitable to buy than to raise or produce in our own country. Instead of being rivals we shall be in the broadest sense partners—the one country will be a complement of the other. The United States will not be swamped by the products of the loom and the forge of Japan; Japan will not be stifled under an avalanche of factory-made goods of New England and the Pacific coast; but those great ships that move so majestically across the broad bosom of the Pacific will be freighted deep with the wares of the Orient and the Occident, adding to the wealth of the world and making both countries richer because of the enlightened policy that leads nations to buy and sell to each other and profit by both operations.

In China, Japan seeks no unfair advantage. She asks no favor from China that is not granted to England or the United States or to the entire world. With England and the United States she stands for the open door and, in the words of your great President, "square deal."

Under these conditions Japan is willing to take her chances in the rivalry of trade. We believe in the survival of the fittest in trade as well as in social development. If, in a fair field, we cannot hold our own position we shall be crowded out of the race, and it is right we should be. But we know that the trade of China is large enough for us all; that we can all share in it to our profit as well as to that of China, and instead of building on the ruins of a rival, we can build side by side for mutual advantage.

THE PURPLE VEIL

A ROMANCE OF THE SEA

OFF the New England coast a curious object is often found floating on the water, somewhat resembling a lady's veil of gigantic size and of a violet or purple color. The fishermen allude to it generally as the "purple veil," and many have been the speculations concerning its nature and origin. In 1871 the late Prof. Spencer F. Baird had the opportunity of examining one of these objects at sea, and he found it to present the appearance "of a continuous sheet of a purplish-brown color, 20 or 30 feet in length and 4 or 5 feet in width, composed of a mucous substance, which was perfectly transparent, to which, as a whole, a purple color was imparted by the presence of specks distributed uniformly throughout the mass to the number of about thirty or more to the square inch."

On examining the substance with a magnifying glass it was found that each little speck consisted of an embryonic fish, moving vigorously within the narrow limits of a little cell in the jelly-like mass, so that it was obvious that the purple veil, as a whole, was the egg-mass of a fish.

It is somewhat startling to be told, by so good an authority as Dr Theodore Gill, that the purple veil is the product of a single fish, and not so very large a fish either, as it rarely exceeds 3 feet in length, and that as many as 1,000,000 eggs may be contained in a single egg-mass. By allowing the eggs to develop under observation, Alexander Agassiz succeeded in identifying the parent fish as the *Lophius piscatorius*—variously known as the "Goose-fish," the "All-mouth," or the "Angler," one of the most remarkable fishes in existence.

It derived its name of "Goose-fish" from its "having been known to swallow live geese," a statement almost incredible; but a reputable fisherman told the late G. Brown Goode that "he once saw a struggle in the water, and found that a Goose-fish had swallowed the head and neck of a large loon, which had pulled it to the surface

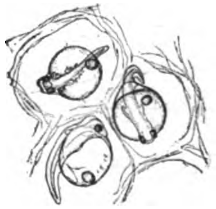


FIG. 1.—Three eggs embedded in the gelatinous membrane in which they are laid; magnified. (After A. Agassiz.)

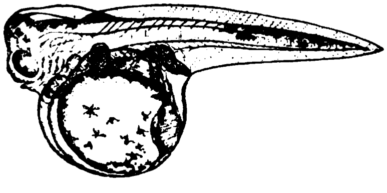


FIG. 2.—Young Angler taken out of the egg just previous to hatching. (After A. Agassiz.)

and was trying to escape." There is authentic record of seven wild ducks having been taken from the stomach of one of them. Slyly approaching from below, they seize birds as they float upon the surface. Reliable Cape Cod fishermen, Captains Nathaniel E. Atwood and Nathaniel Blanchard, assured Dr D. H. Storer that "when opened entire sea-fowl, such as large gulls, are frequently found in their stomachs, which they supposed them to catch in the night, when they are floating upon the surface of the water." Dr Storer was also informed by Captain Leonard West, of Chilmark, Mass., that he had known a Goose-fish to be taken having in its stomach six coots in a fresh condition. These he considered to have been swallowed when they had been diving to the bottom in search of food.

Any one who has looked into the vast cavity behind the jaws of this fish will concede the aptness of the name "All-mouth." The fish is a most voracious, carnivorous animal—indeed omnivorous—and quite indiscriminate in its diet. In Massachusetts it is said to annoy the fishermen "by swallowing the wooden buoys attached to the lobster pots," and a man is stated to have caught one "by using his boat anchor for a hook." Another feature of the fish is the slowness of its digestive powers, which is aptly illustrated by Couch, who says that on one occasion there were found in the stomach of this fish "nearly three-quarters of a hundred herring; and so little had they suffered change that they were sold by the fishermen in the market without any suspicion in the buyer of the manner in which they had been obtained."

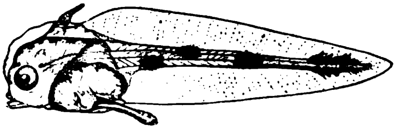


FIG. 3.—Young Angler not long after hatching; the yolkbag has entirely disappeared. (After A. Agassiz.)

The name "Angler" is not one in general use among shoremen and fishermen. It is a book name, and was specially coined for the *Lophius piscatorius* by Thomas Pennant in 1776. In his British Zoölogy he says he "changed the old name of *Fishing-frog* for the more simple one of *Angler*" simply because he did not like the former, which was one of the popular names. There was no lack, however, of other popular names from which to choose. In England the fish was known as the Fishing-frog, Frog-fish, Toad-fish, Pocket-fish, Monk-fish, Nass-fish, Sea-devil, Devil-fish, Wide-gut, Wide-gap, and Kettle-maw, and in America still other names were employed. On the Massachusetts coast it was known as the Goose-fish, in Rhode Island as the Bellows-fish, in Connecticut as the Molly-gut, and in North Carolina as the All-mouth.

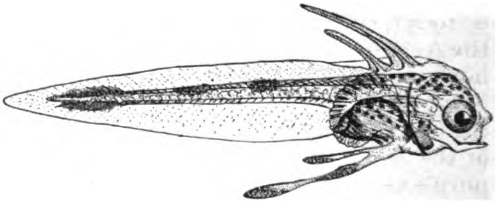


Fig. 4.—Young Angler with 2 elongated dorsal rays and rudiment of third and 2 large ventral rays. (After A. Agassiz.)

Although the Angler in its adult form is familiar to the fishermen of most countries under some of its various names, little or nothing was

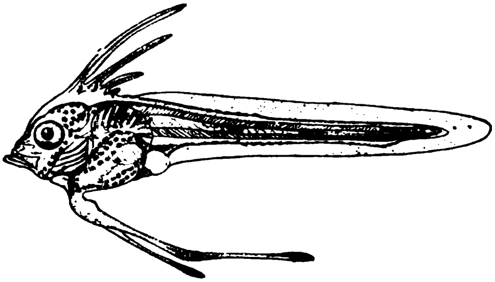


FIG. 5.—Young Angler showing still greater increase in length and number of anterior dorsal and ventral rays. (After A. Agassiz.)

known about its young until the discovery of the embryonic fish within their floating cradle in the "purple veil," and their subsequent identification as Anglers by development under observation. Dr Theodore Gill has now brought together the scattered fragments of knowledge relating to the development of this fish in an illustrated article published among the Smithsonian Miscellaneous Collections (vol. 47, part 4, May 6, 1905), entitled "The Life History of the Angler." All the statements given here are taken from this article.

Figures 1, 2, 3, 4, 5, 6, 7, and 8 illustrate various stages in the development of the Angler from the egg within the purple veil up to almost the adult form. In the stage of development shown by figure 6 the little fish when viewed from above, as in figure 7, reminds us somewhat of a long-tailed butterfly. In figure 8 the characteristic seaweed-looking appendages have been developed, and the fish is almost adult. In figure 9 the adult form is shown, and the peculiar nasal appendage with its frond-like extremity, which is supposed to serve as a bait for other fish, is well seen. The book name "Angler" is peculiarly appropriate to this fish in view of the fact that its chief occupation in life seems to consist in lying quietly at the bottom of the sea angling for other fish. According to Day, it often lies as if dead, "while its floating filaments, kept in motion by the tide, decoy other fish, and the Angler's tendril is no sooner touched than the game is caught."

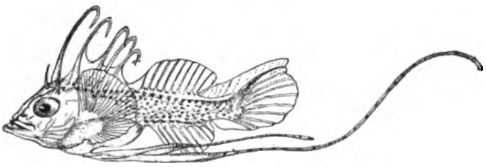


FIG. 6.—Young Angler in oldest pelagic stage, measuring 30 millimeters in length, seen in profile. (After A. Agassiz.)

Dr Theodore Gill quotes an interesting account of this fish written by Saville Kent, who had excellent opportunities of observing a large individual in the Manchester Aquarium in 1874.

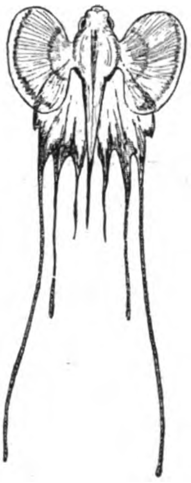


FIG. 7.—Young Angler of oldest pelagic stage, seen from above. (After A. Agassiz.)

The attention of Saville Kent was struck by the marvelous way in which this specimen would disappear in the aquarium without any apparent hiding place. "He is ever slinking off to the rock-work, and establishing himself so closely in some snug corner that it requires, notwithstanding his large size, a considerable amount of diligent search to detect him."

While the creature lay perfectly still,

it was difficult to distinguish the head of the fish from a piece of rock covered with sea-weed, calcareous sponges (*Grantia compressa*), ascidians, zoophytes, and the other low invertebrate forms which are usually to be seen on a rocky shore at low tide. The nasal appendage appeared to be the facsimile of a young frond of oar-weed (*Laminaria digitata*); but the most extraordinary mimicry of all appeared—where we would least expect it—in the creature's eyes! Saville Kent says:

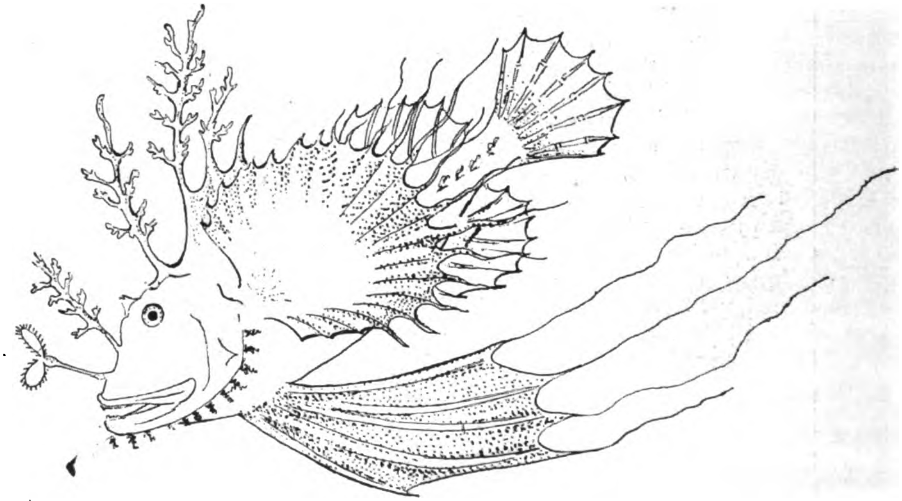


FIG. 8.—Young Angler with most of the characteristics of adults, but larger pectorals and ventrals and less flattened head. (After Rüppell.)

"These organs are very large and prominent, the iris being conical in shape, of a yellow ground color, with longitudinal stripes of a darker shade, while the pupil, commencing abruptly at the summit, is of so jetty a hue that the aspect of the whole is that of a hollow truncated cone, resembling, with its longitudinal stripes, the deserted shell of an acorn barnacle, and with an amount of exactness that is apparent to the most ordinary observer.

"We have here in this fish, then, the most perfect possible embodiment of a rocky boulder, with its associated animal and vegetable growths.

"Lying prone at the bottom of the ocean among ordinary rocks and débris, it might well pass muster as an inanimate object, and the other fish on which it preys would approach it with impunity, and never discover their mistake until too late to escape from its merciless jaws.

"Ensconce the animal snugly, however, in the crevice of some precipitous submarine cliff, and the illusion is more perfectly complete. No strategy need now be exerted by the voracious fish to attract his prey; he has only to lie close and quiet, letting his tendrils sway to and fro in the passing current like the weeds around him, and the shoals will approach browsing the vegetation or pursuing their crustaceous diet—*right into his very mouth.*"

H. A. L.

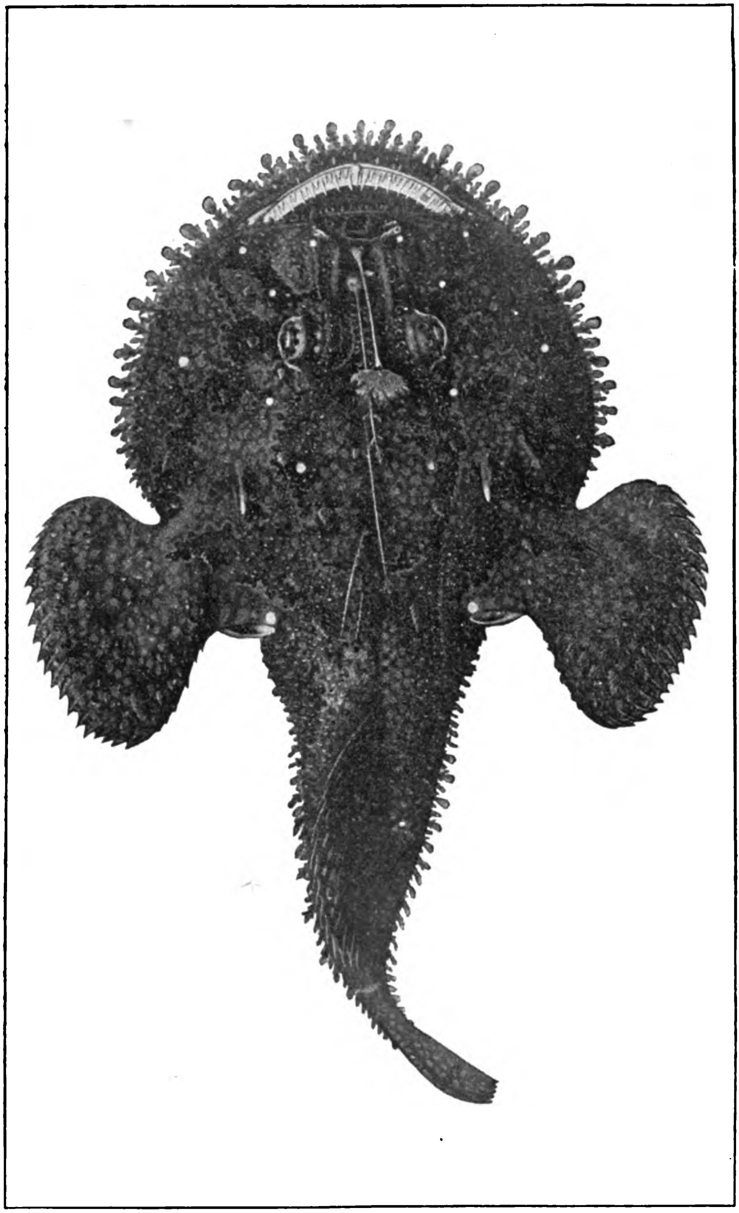


FIG. 9.—The Common Angler (*Lophius piscatorius*). (After W. von Wright in Smitt.)

For this and the preceding eight illustrations the Magazine is indebted to Dr Theodore Gill, of the Smithsonian Institution

OUR MINES AND QUARRIES

THE United States Bureau of the Census has published a handsome report on the mines and quarries of the United States for 1902. It is a volume of 1,100 quarto pages, giving a very complete and detailed account of our diverse mineral resources, the annual products of which are worth more than $1,000,000,000. An interesting feature of the report is the chapter on electricity in mining, by Thomas C. Martin. The remarkable progress made in recent years in transmission of power through the utilization of water-courses has enabled mining men to use electricity in every branch of their work. Electric locomotives have been substituted for cars pulled by horses or men. Electric motors are used for all kinds of work—drilling, coal cutting, hoisting, pumping, ventilating, etc. As a result a great many mining regions which formerly were too costly to operate from lack of fuel are now worked with much profit.

The report also contains interesting chapters on copper, iron ore, gold, and silver, petroleum, quarries, and every important mineral. It also discusses the resources of the different states.

The census statistics were gathered in collaboration with the division of the mineral resources of the Geological Survey, among those who contributed to its success being Messrs Wm. M. Steuart, Joseph D. Lewis, David T. Day, F. H. Olyphant, Joseph Struthers, Story B. Ladd, Joseph Hyde Pratt, George F. Kunz, Joseph Middletown, George P. Merrill, William F. Willoughby, and Isaac A. Hourwich.

THE HOME OF THE NATIONAL GEOGRAPHIC SOCIETY

THE deed of trust conveying Hubbard Memorial Hall to the National Geographic Society was accepted by the Board of Managers on behalf of the Society at a meeting held in Washington, June 14, 1905. By the terms of the deed the building is to be held by Charles J. Bell, President of the American Security and Trust Company of Washington, D. C., "in trust for the sole use and benefit of the said National Geographic Society so long, and for and during such period of time, as said Society shall continue its corporate existence under its present charter, and shall continue to use and occupy the said land and premises and the improvements thereon for the objects and purposes set forth in its certificate of incorporation."

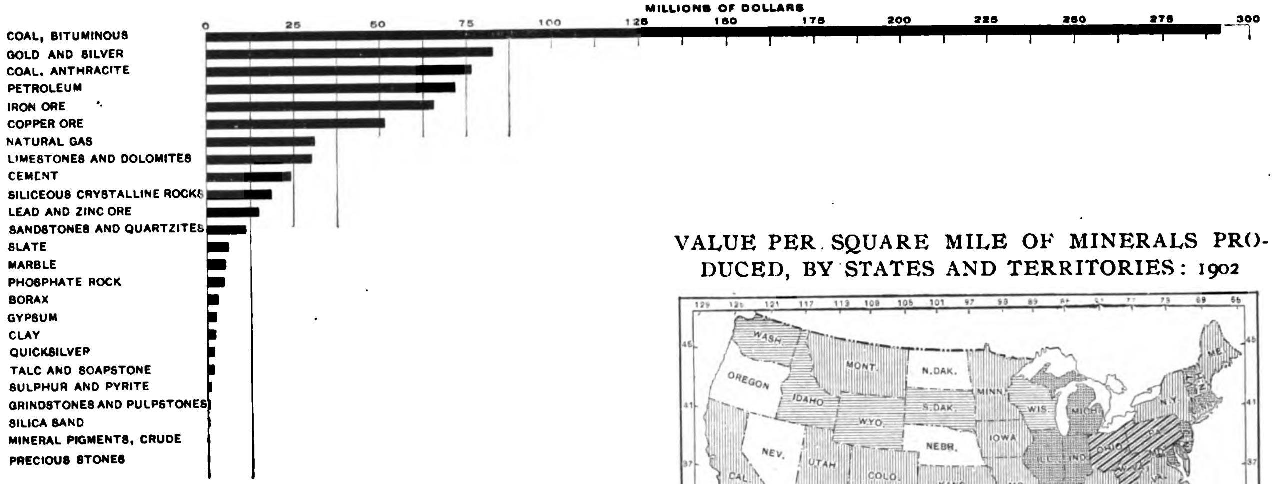
In accepting the gift the Board of Managers unanimously adopted the following resolution:

"*Resolved*, That the National Geographic Society, through its Board of Managers, express to the donors of Hubbard Memorial Hall, Gertrude M. Hubbard (Mrs. Gardiner Greene Hubbard), Alexander Graham Bell, Mabel G. Bell (Mrs. Alexander Graham Bell), Charles J. Bell, Grace Hubbard Bell (Mrs. Charles J. Bell), Helen A. Bell, Grace Hubbard Bell, Gertrude H. Grossmann (Mrs. Peter Stuyvesant Pillot), Elsie Graham Bell Grosvenor (Mrs. Gilbert H. Grosvenor), Marian Graham Bell (Mrs. David G. Fairchild), Gardiner H. Bell, Robert W. Bell, Melville Bell Grosvenor, Gertrude Hubbard Grosvenor, and Rosalie Pillot, its sincere thanks for their handsome gift to the Society. The members of the National Geographic Society appreciate the great interest of the donors in the welfare and work of the Society, and accept this new and generous evidence of their interest with profound gratitude."

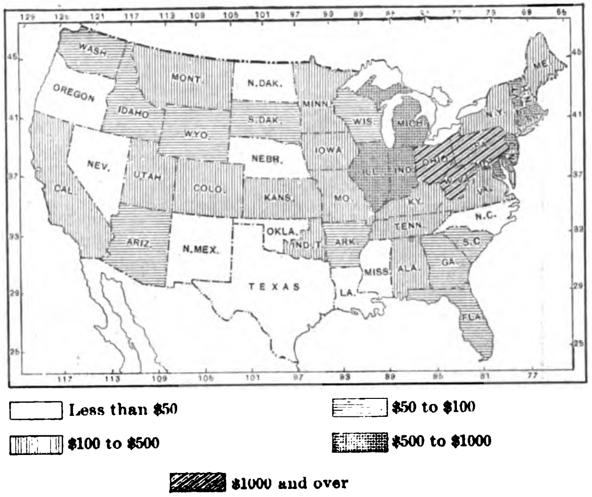
THE GEOGRAPHICAL BALANCE

THE withdrawal of Norway from her ninety years' union with Sweden emphasizes in a rather striking manner the momentous shifting in the geographical balance of Europe which has resulted from the Russo-Japanese war. The geographical pivot of the European continent has passed from

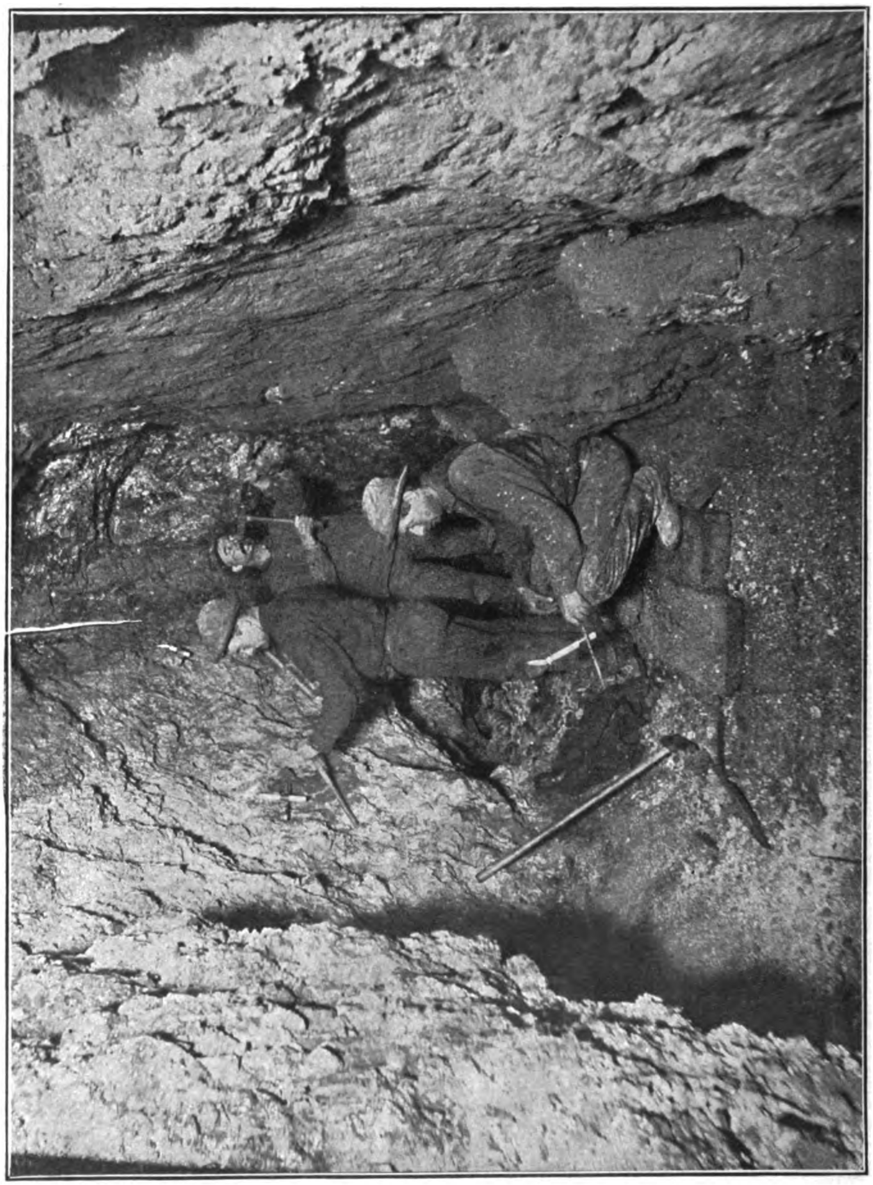
PRODUCTION OF PRINCIPAL MINERALS: 1902



VALUE PER SQUARE MILE OF MINERALS PRODUCED, BY STATES AND TERRITORIES: 1902

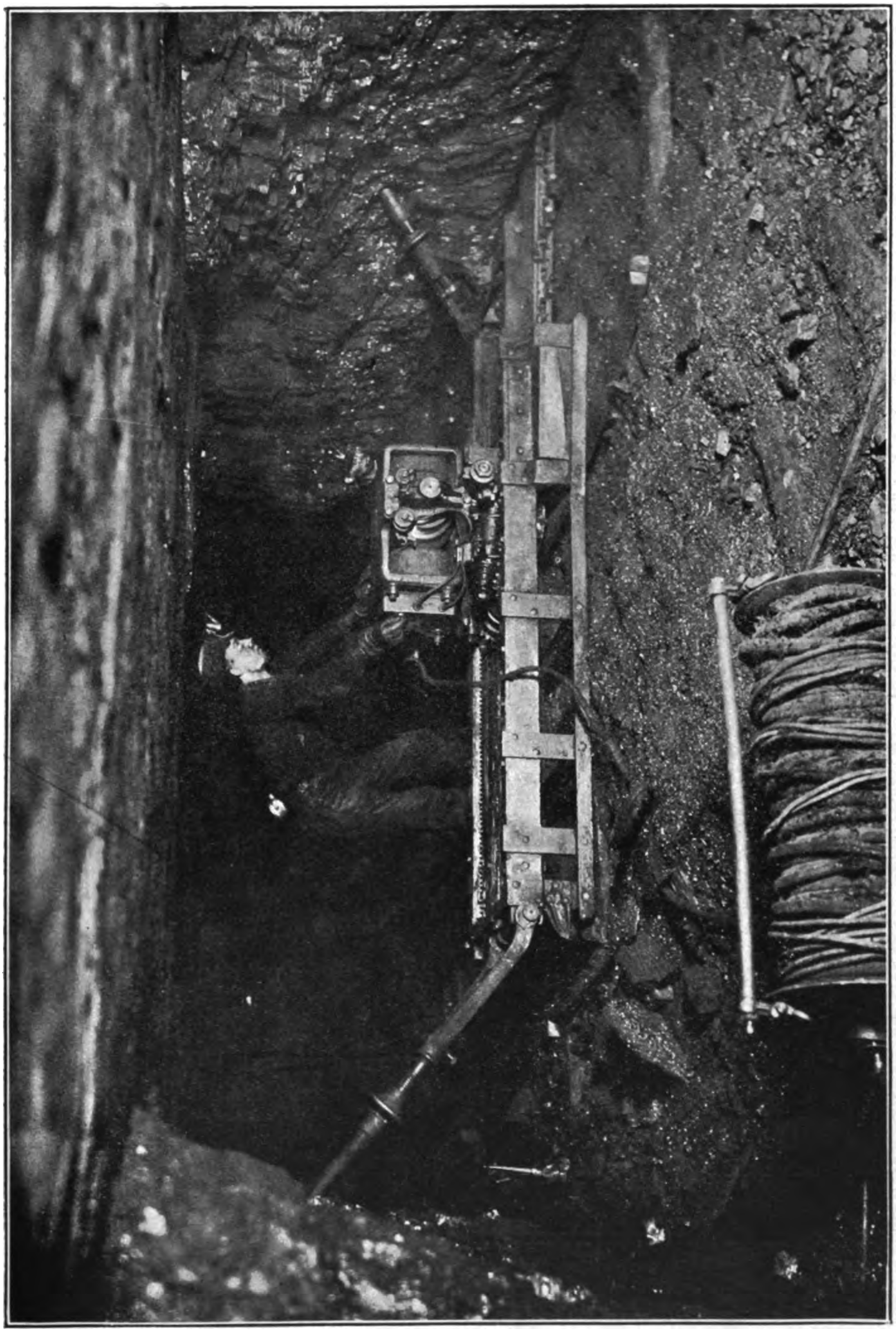

WASH.
OREGON
CAL.
NEV.
IDAHO
MONT.
WYO.
UTAH
ARIZ.
COLO.
N.MEX.
N.DAK.
S.DAK.
NEBR.
KANS.
OKLA.
IND.T.
TEXAS
MINN.
IOWA
MO.
ARK.
LA.
WIS.
ILL.
MICH.
IND.
OHIO
KY.
TENN.
MISS.
ALA.
GA.
FLA.
S.C.
N.C.
VA.
N.Y.
ME.
Less than $50
$50 to $100
$100 to $500
$500 to $1000
$1000 and over

From the U. S. Census Office



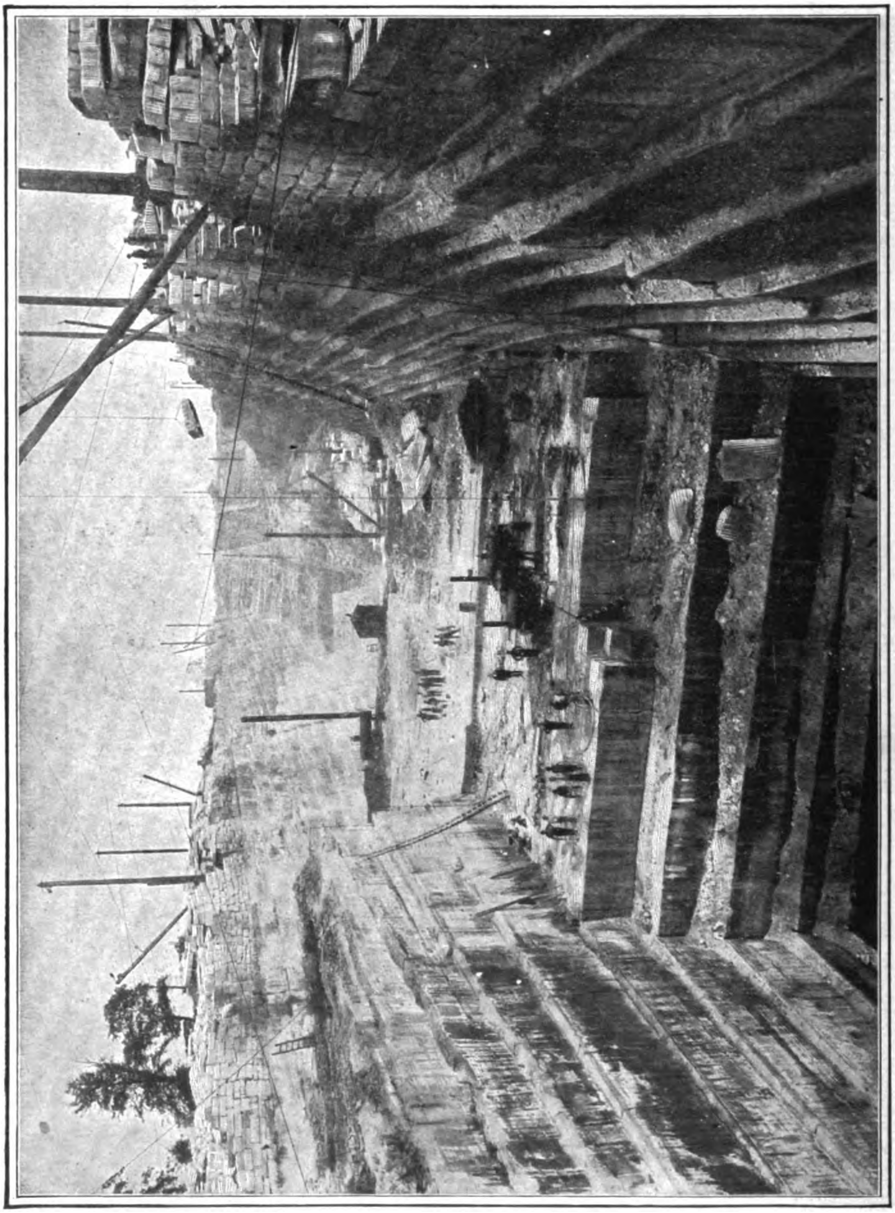
From Isaac A. Hourwich, Bureau of the Census

A Vein in a 1200-foot Level, Daly-Judge Mine, Park City, Utah



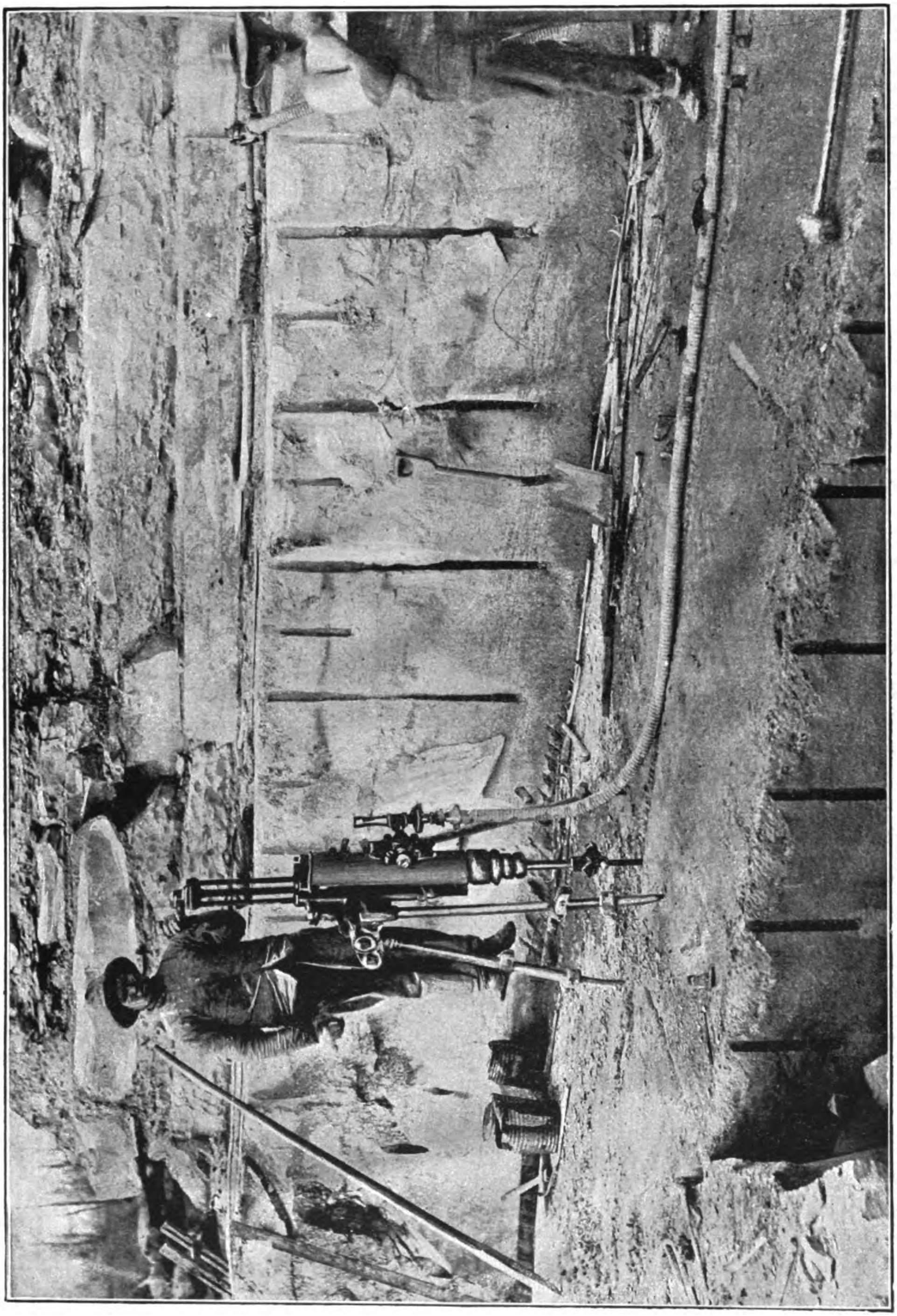
From T. C. Martin, Bureau of the Census

An Electric Coal Cutter



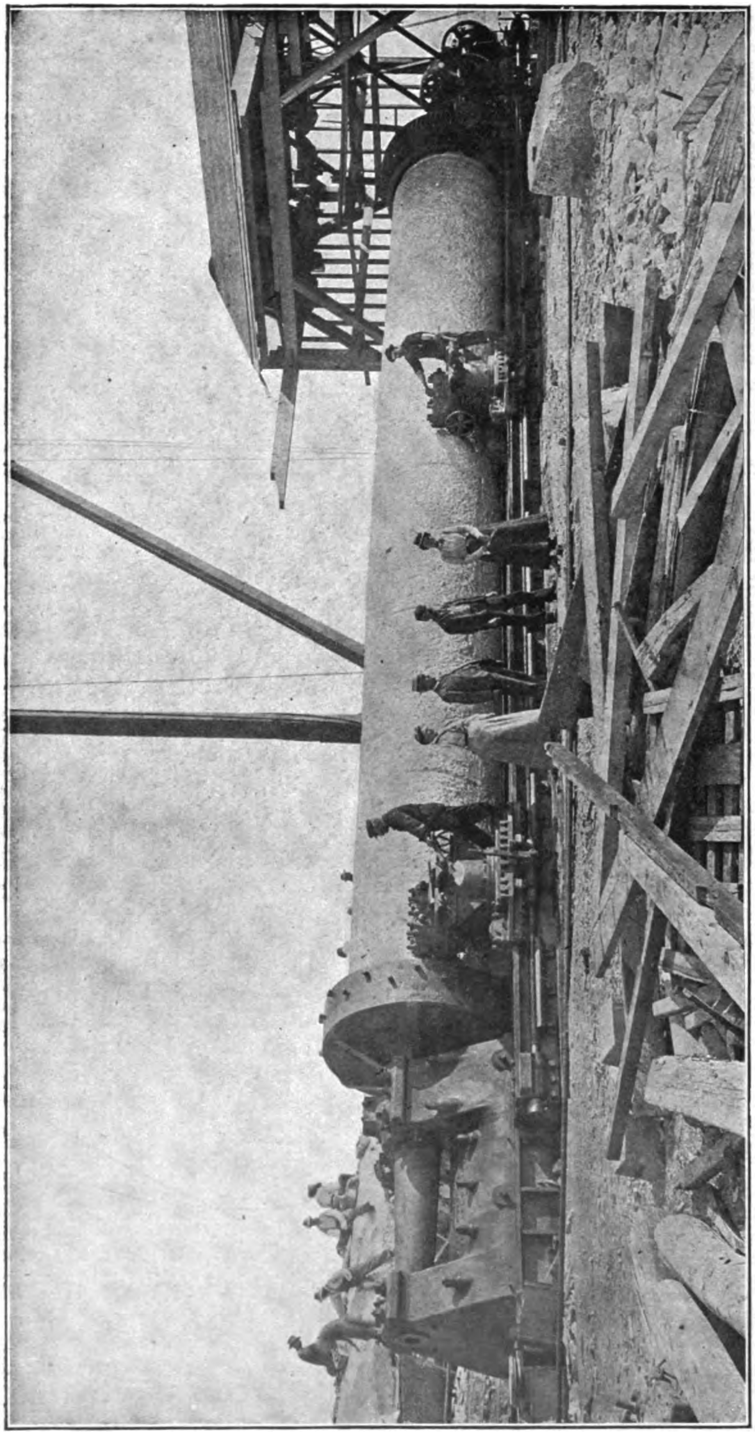
From George P. Merrill, Bureau of the Census

View near Western End of Great Canyon Sandstone Quarry, Amherst, Ohio



From George P. Merrill, Bureau of the Census

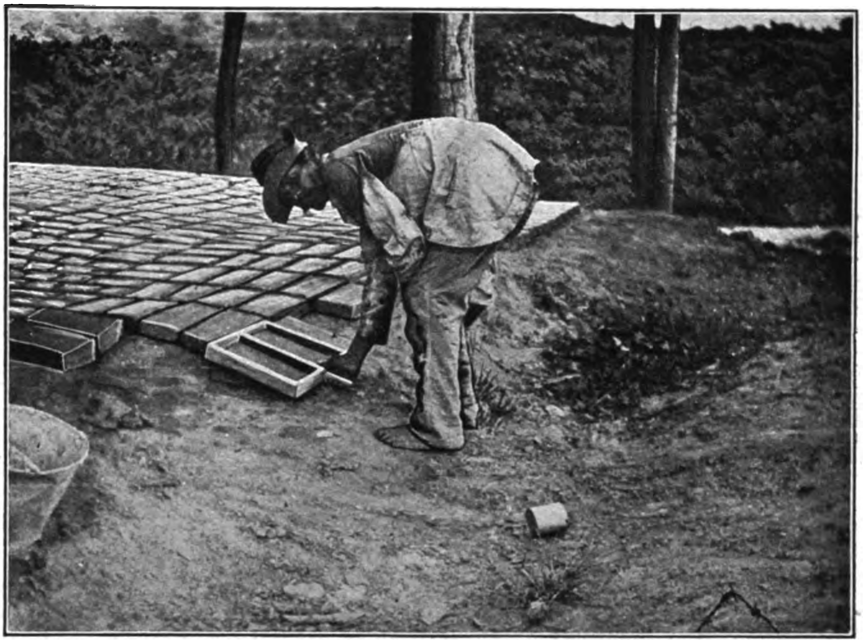
Steam Drill Used in Stone Quarrying



From George P. Merrill, Bureau of the Census

Large Granite Column-cutting Lathe at Vinalhaven, Maine

Weight, 135 tons; swings 6 feet 6 inches by 60 feet in length, with 8 cutters. View of first column being turned in lathe



From William F. Willoughby, Bureau of the Census

Porto Rico—Molding Bricks by Hand

Russia to Germany. Russia does not have in European waters a single battleship, and she is almost as helpless as Turkey to prevent Norway and Sweden from doing as they wish. Norway has a population of 2,000,000 and Sweden over 5,000,000.

Meanwhile Germany has been quietly growing. Her population is now 60,000,000; her wealth has increased enormously; while in 1870 her resources were comparatively limited, they are today very large. France has a population today of about 40,000,000, which is a comparatively small advance in 35 years. France is wealthier than in 1870, but her supply of men is about the same, whereas Germany has doubled her supply of men and increased her financial strength many times. Germany needs more ports, almost as much as Russia does. Her 60,000,000 people do not find Hamburg and Bremen and her minor harbors sufficient for her expanding commerce. Little Denmark and little Holland may help her out.

Morocco, according to recent explorations, has an area of useful land equal to the state of California. Many parts of the country are admirably adapted for colonization. The climate in large sections is healthful; there is mineral wealth besides, so that the country offers a promising field for development. Naturally Germany wants a share in its development, particularly as she has good prospects of reaching the Adriatic before many generations.

THE VICTORIA FALLS

OUR honored Speaker of the House of Representatives, Joseph Cannon, was 19 years of age when the Victoria Falls were discovered by Livingstone, 1,000 miles from the British outposts in South Africa. So rapidly has the

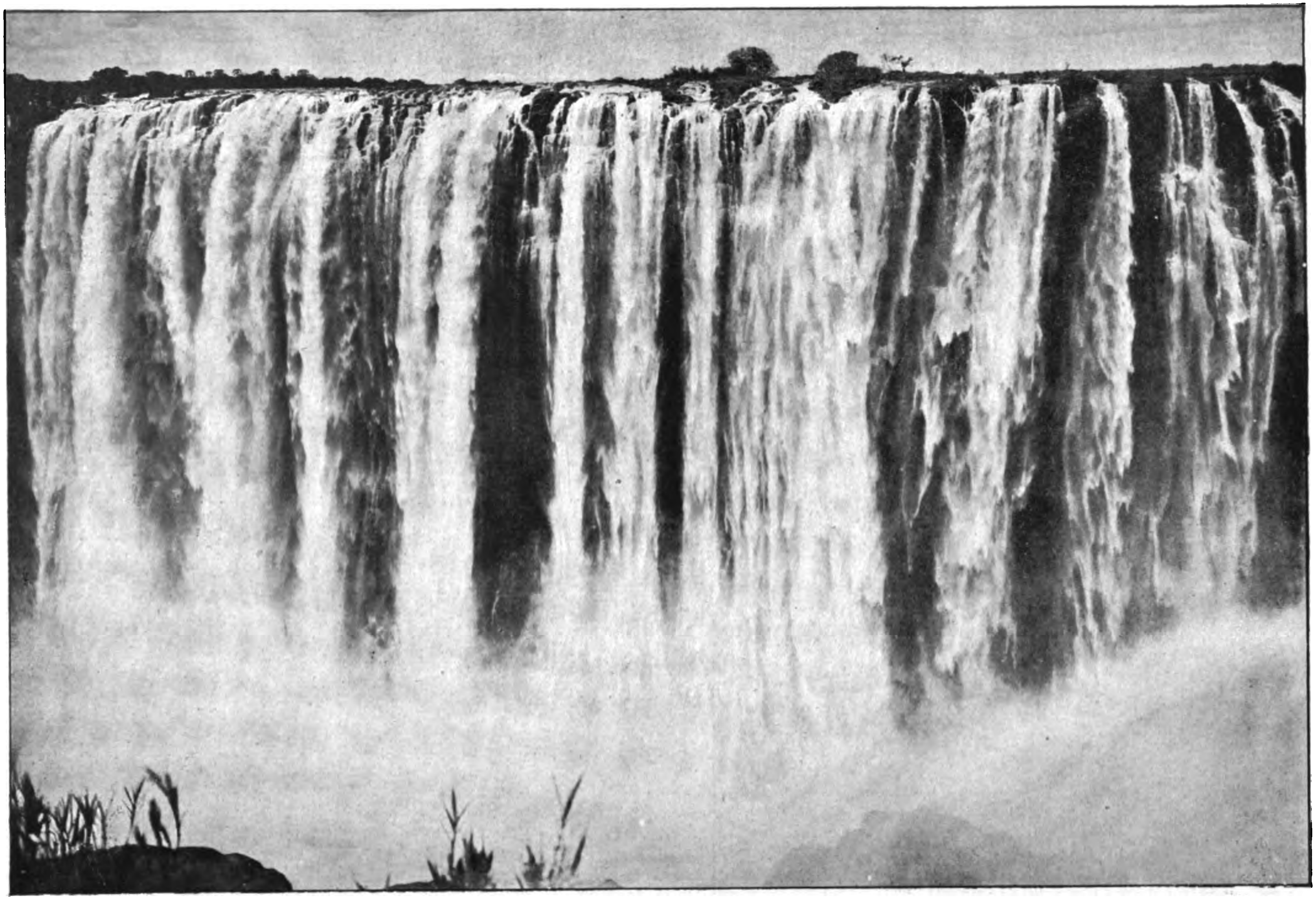


Photo by Pedrotti, Bulawayo (copyright)

The Grand Falls

At high river this is one expanse of falling water, but now separated into numerous cascades in the crevices of the rock. Note the continuance of the river level to the very edge of the falls

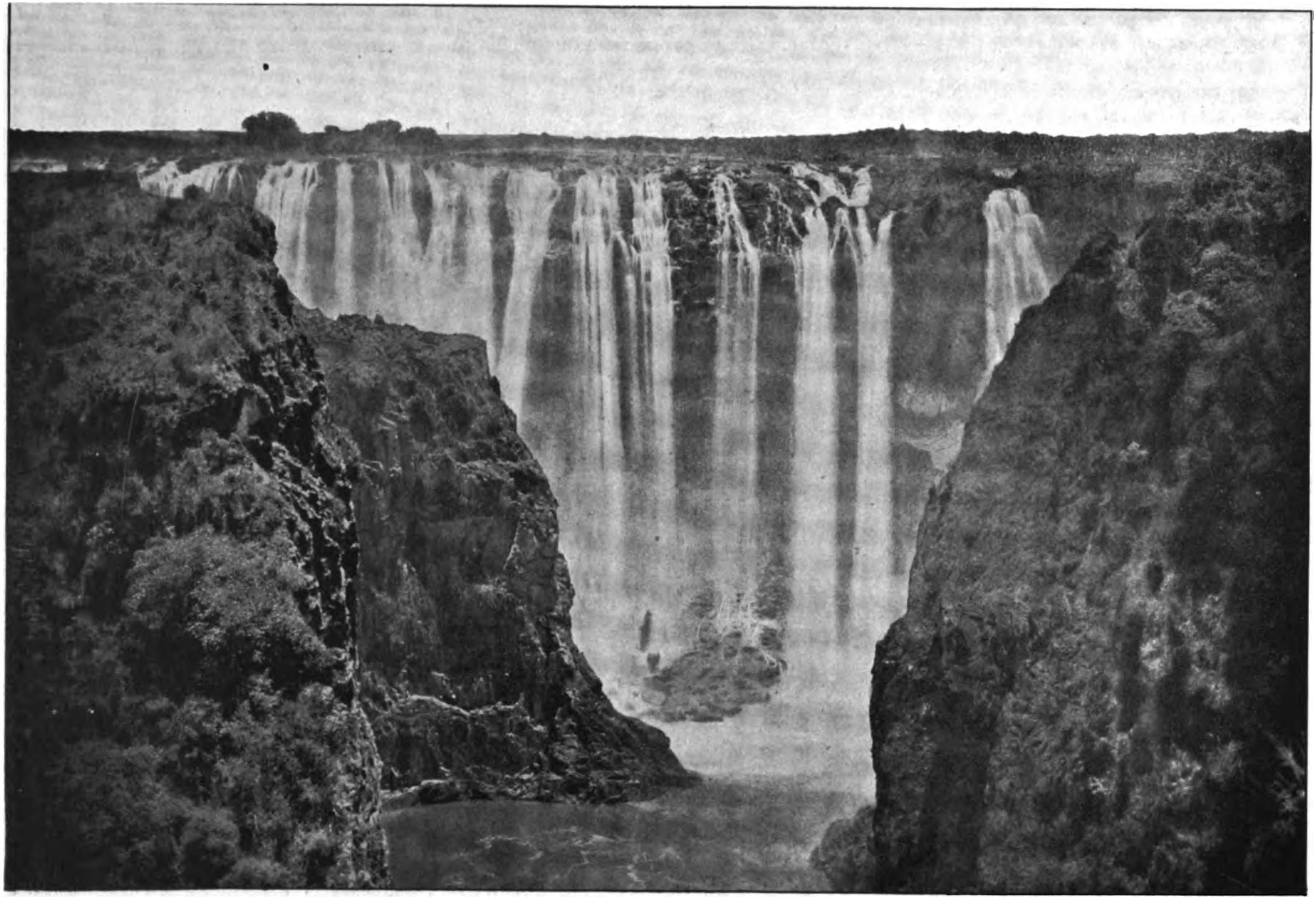


Photo by Pedrotti, Bulawayo (copyright)

View of Falls seen through the Jaws of the Gorge

Danger Point on the left, the promontory of the "knife edge" on the right

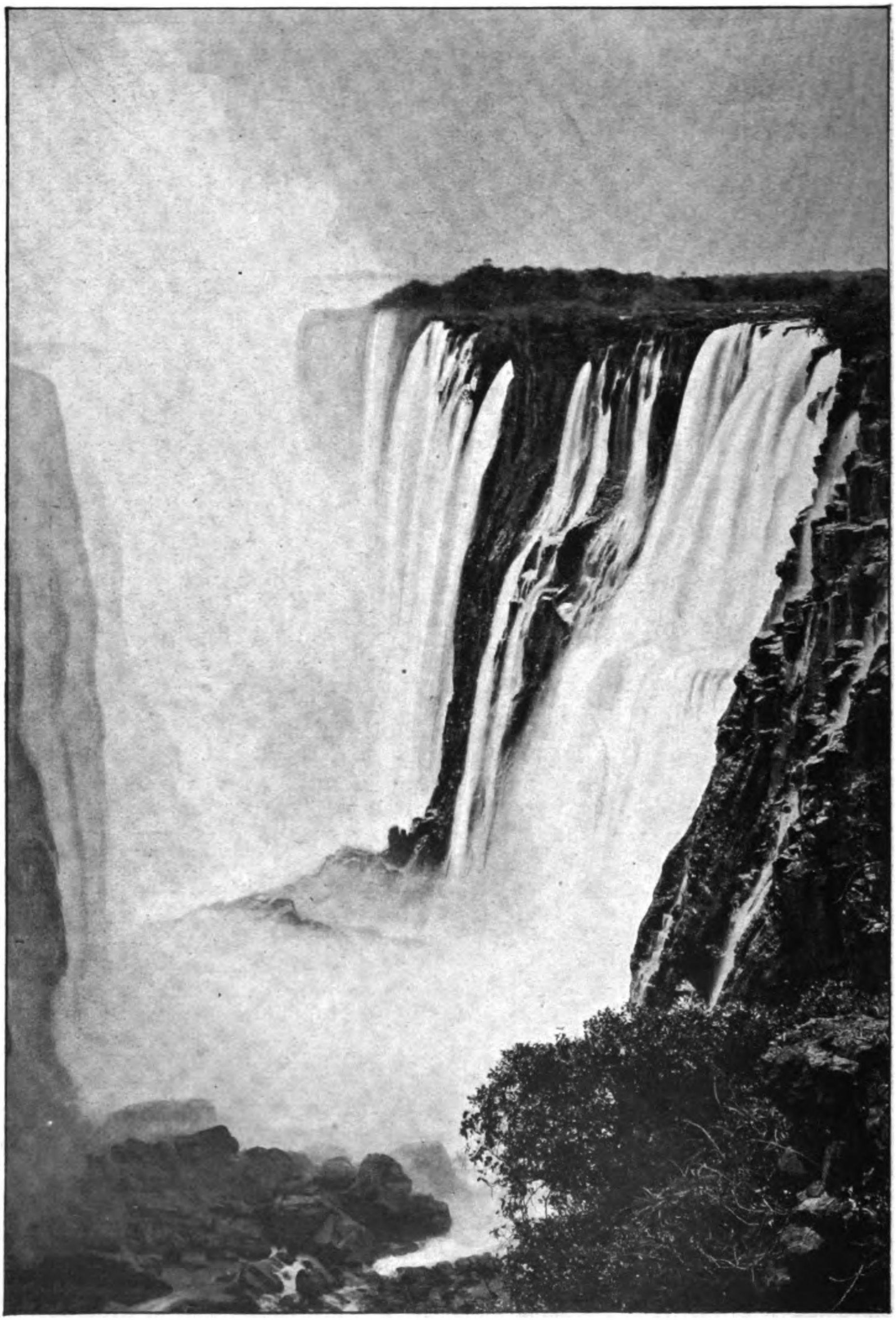


Photo by Pedrotti, Bulawayo (copyright)

View looking into Chasm from its Eastern End

Vertical wall of "knife edge" on the left. Columnar structure of the basalt clearly shown in the rocks on the right. Debris of broken-down blocks at bottom of chasm.

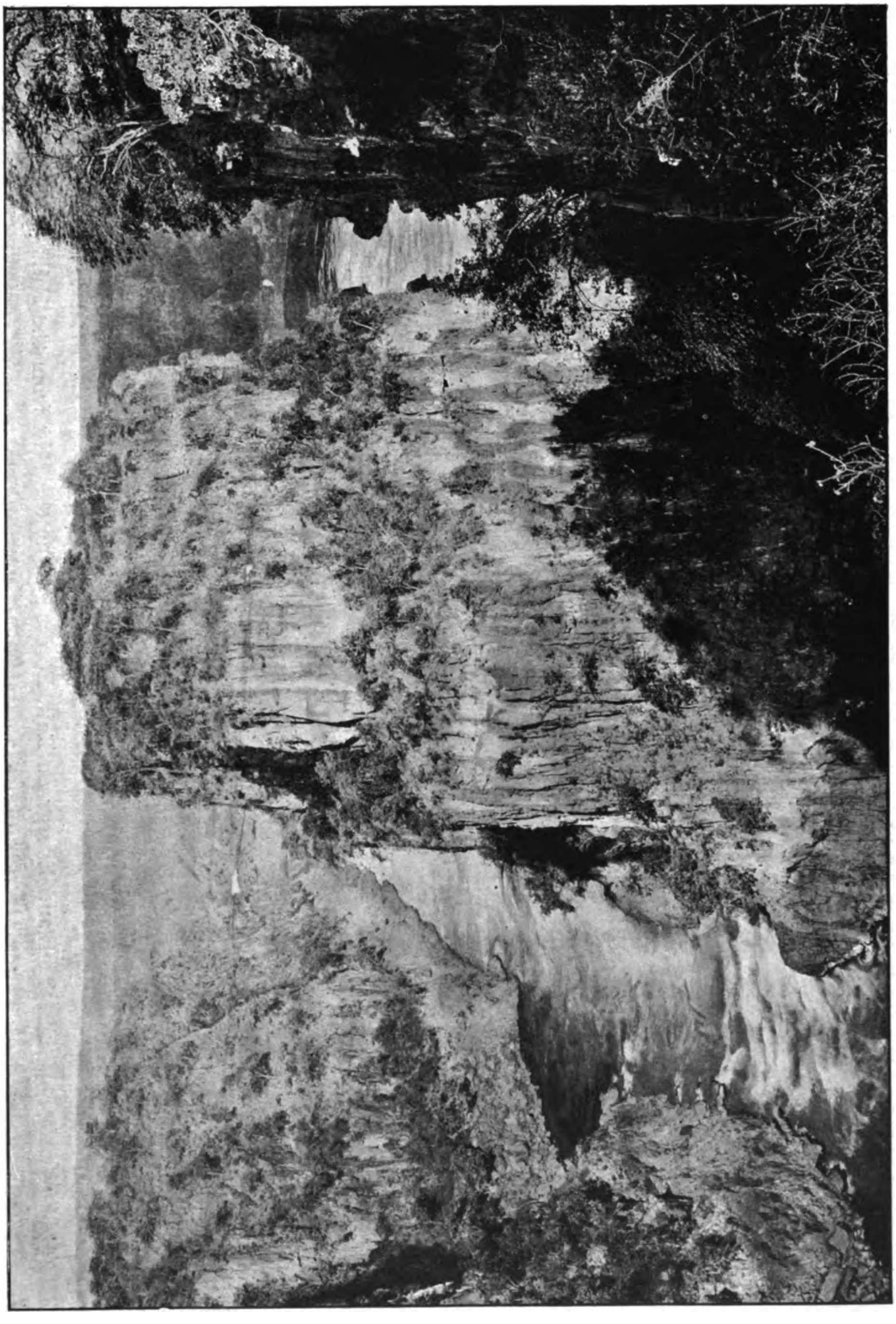


Photo by Pedrotti, Bulawayo (copyright)

View of Bend in Canyon

Taken at time of low water, showing flood mark 40 feet higher. Height above water level, 400 feet. Note columnar cleavage of basalt beds, with trees growing in scoriaceous matter between

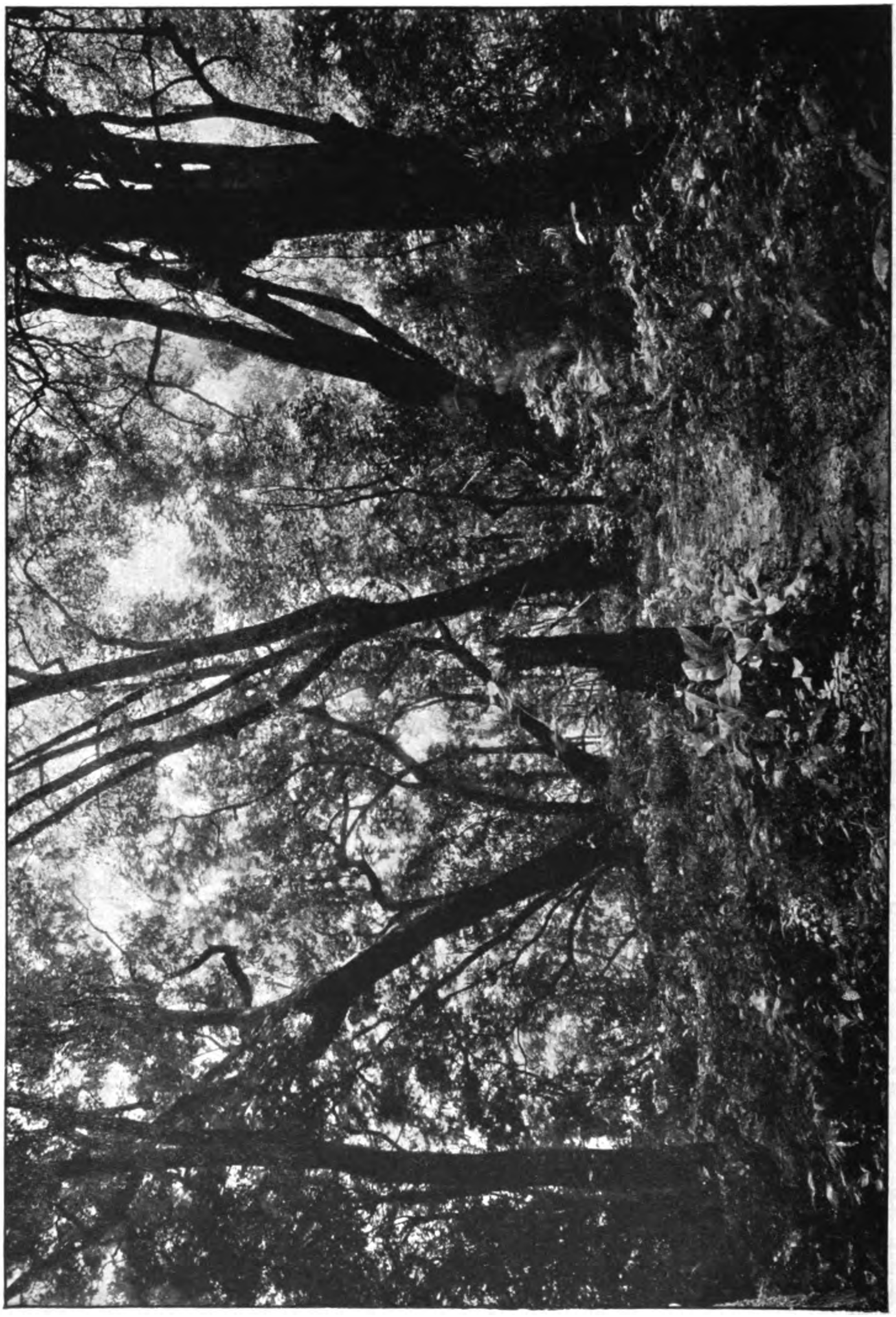


Photo by Pedrotti, Bulawayo (copyright)

The Rich and Evergreen Rain Forest Fed by the Mist from the Falls man of commerce followed in the track of the explorer, however, that the highest steel bridge in the world is today being built across the falls. The Royal Geographical Society of London, under whose auspices Livingstone was working when he found the falls, has recently published in its journal a description of the falls, and to it this Magazine is indebted for the accompanying illustrations. The Victoria Falls are so distant from great centers of industry that they are not likely to be called upon to furnish power for many centuries. Some years hence, when the waters of Niagara are employed for commerce, and travel across the oceans becomes easier, thousands may journey annually to see the magnificence of the Victoria Falls. The Victoria Falls are not so wide as Niagara, but they are nearly twice as high, their dimensions being 3,000 feet in width and 360 feet in height, as against 4,750 feet in width and 164 feet in height for Niagara. The *Century Magazine* for June, 1905, contains a good account of the falls.

MR WILLIAM ZIEGLER

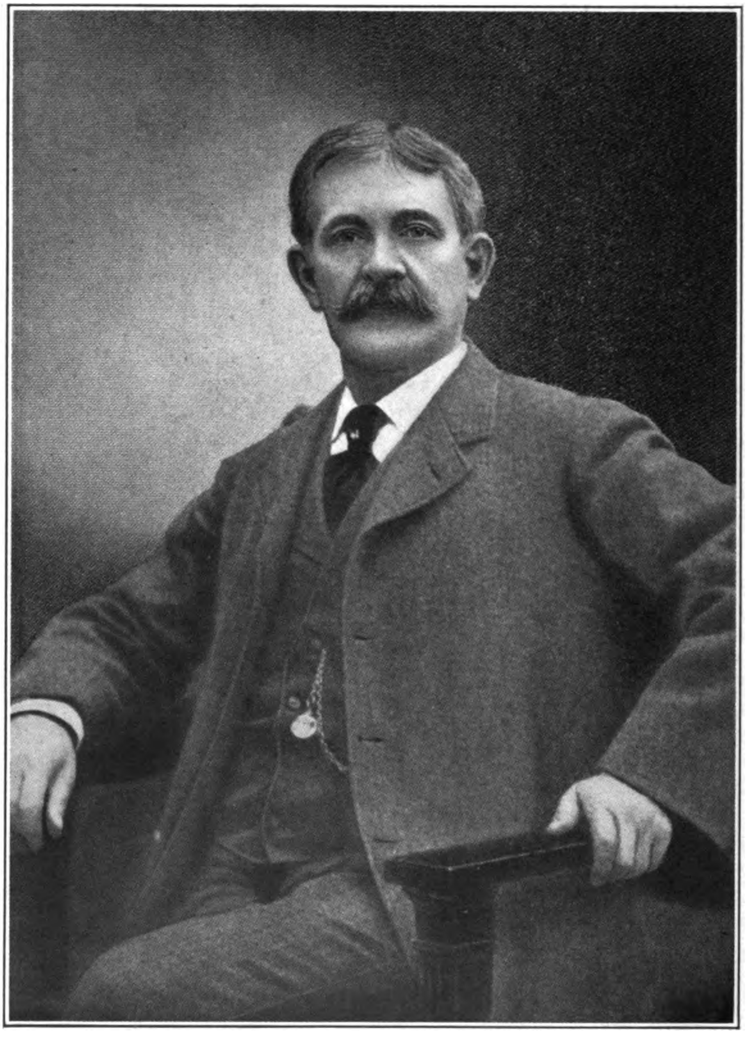
MR William Ziegler, who has so generously supported Arctic explorations during the past five years, died at his summer home, in Connecticut, May 24, 1905. He had been in the best of health until November, 1904, when he was thrown from his carriage and seriously injured.

Mr Ziegler was born in Beaver county, Pennsylvania, in 1843. He began to earn his living at the age of 13 in a printer's office. Later he became a druggist's clerk and much interested in chemical experiments. The story of how he gradually made a fortune in baking powder and real estate is typical of many of our prominent and progressive Americans.

Several years after he had retired from business Mr Ziegler became interested in the search for the North Pole. He had no desire to advertise his name, but was ambitious that the American flag should be the first to be planted at the North Pole. His wealth enabled him to equip expeditions unaided. The first expedition, the Baldwin-Ziegler of 1901–1902, proved very unsuccessful. They brought back some of the finest pictures of Arctic scenes ever taken, and they also secured the first series of moving pictures that were ever taken in the Arctic regions, but Mr Ziegler felt so badly about the failure of the expedition that he refused to give the pictures to the public until he should have something more to announce.

In 1903 he began to make arrangements for a second expedition, known as the Ziegler Polar Expedition, and asked the National Geographic Society to undertake the direction of the scientific work of the expedition. The Society accepted his invitation and appointed Mr W. J. Peters, a member of the Society and one of the best-known explorers of the United States Geological Survey, as its representative. Mr Peters is second in command to Mr Fiala, the leader of the expedition, and has entire charge of the scientific work. It was expected that the party would return in 1904, but the ice was so thick that they were unable to get through. They were abundantly equipped, however, for a prolonged stay in the North Polar regions.

At the time of his death Mr Ziegler had just completed arrangements for the auxiliary expedition which leaves Norway about July 1, under command of Mr W. S. Champ. The Russian government granted the request of the National Geographic Society, forwarded through our State Department, that the expedition be allowed to visit Nova Zembla and there obtain some Siberian dogs. This generous permission of the Russian government will considerably lighten the work of the auxiliary party and give them more time to work through the ice. It is believed that last winter was exceedingly harsh, and that



Mr William Ziegler

the Ziegler parties will need every effort to get through.

Mr Ziegler was a member of the National Geographic Society and was much interested in its work. He was a modest, unassuming gentleman and his untimely death is much to be deplored.

Mr Ziegler left instructions to his executors to take care of his polar expeditions.

THE FOREIGN COMMERCE OF JAPAN

IN spite of the heavy burdens of war, Japan sold to the world and also bought in return more merchandise in 1904 than in any year of her history.

Her imports in 1904 were $184,938,000 in value, as against $157,933,000 in 1903, $143,056,000 in 1900, and $66,311,000 in 1895. Her exports in 1904 also established a new high record, being $158,992,000 in value, as against $144,172,000 last year, $101,806,000 in 1900, and $69,825,000 in 1895. Thus the imports into Japan have increased by $118,627,000 and the exports from Japan by $89,167,000 since 1895.

During the past ten years Japan has imported about $200,000,000 more than she has exported, the excess of the imports over the exports averaging about $20,000,000 annually.

Japan imports most largely from Great Britain, British India, the United States, China, and Germany, these five countries supplying about 77 per cent of her total imports. Of the total imports into Japan in 1904, amounting to $184,938,000, the United Kingdom supplied $37,346,000, or 20.2 per cent; British India (including Straits Settlements), $35,228,000, or 19 per cent; the United States, $28,942,000, or 15.7 per cent; China, $27,295,000, or 14.8 per cent, and Germany, $14,291,000, or 7.7 per cent.

Of the exports from Japan, amounting to $158,992,000 in 1904, the principal countries of destination are the United States, $50,423,000; China, $33,857,000; France, $18,087,000; Hongkong, $14,024,000; Korea, $10,154,000; Great Britain, $8,787,000, and Italy, $6,011,000, these seven countries taking about nine-tenths of the exports from Japan. The United States is by far Japan's best customer, exports to the United States from Japan representing about one-third of her total sales to foreign countries. Among the nations exporting goods to Japan, however, the United States occupies a lower rank, being exceeded by both Great Britain and British India.

The relative progress made by the United States and the United Kingdom in the import trade of Japan is shown by the following table:

Year.	Total imports into Japan.	Imports from the United States.	Imports from the United Kingdom.
1884	$25,786,000	$2,163,000	$11,087,000
1889	48,520,000	4,509,600	19,134,000
1894	58,271,000	5,448,000	20,926,000
1899	109,760,000	19,031,000	22,329,000
1900	143,056,000	31,255,000	35,676,000
1901	127,397,000	21,299,000	25,187,000
1902	135,322,000	24,229,000	25,081 000
1903	157,933,000	23,044,000	24,271,000
1904	184,938,000	28,952,000	37,346,000

NOTE.—Value of yen: 1884, 86.9 cents; 1889, 73.4 cents; 1894, 49 6 cents; 1899 to 1904, 49.8 cents.

The principal articles imported into Japan from the United States in the calendar year 1904 were: Kerosene oil, 5.5 million dollars; flour, 4.6 millions; raw cotton, 4.5 millions; machinery and parts thereof, about 2 millions; iron and steel manufactures, 1.9 millions; leather, 1.7 millions; cotton manufactures, 1.1 millions; wheat and other grains, canned provisions, cars and carriages, leaf tobacco, and coal, the last five items showing figures less than 1 million dollars.

Japan's principal exports to the United States were: Raw silk, 30.4 million dollars; silk manufactures; 6.1 millions; tea, 5.6 millions; mats and matting, 2.3 millions; porcelain and earthen ware, about 1 million dollars, and camphor, straw braids, wood-chip braids, sulphur, tooth brushes, and rice, from $620,000 to about $300,000 each.

The August number of this Magazine will contain an address by the Secretary of War, Hon. William H. Taft, on the Philippines, illustrated with a four-colored map of the Philippine Islands.

A Tribute to American Topographers. In an account of a lecture given by Mr Bailey Willis before the geographers of Venice, Professor Penck, than whom there is no higher authority on topographic maps, pays a high compliment to American topographers:

*". . . Above all an opportunity was afforded of obtaining an insight into the really astounding cartographic results achieved by Willis' party in China. The maps which were exhibited gave proof of the very decided superiority of American topographic methods over those employed by most European expeditions. The Willis party carried on plane-table surveys, on a scale of 1:90,000, with 20 to 30 meter contours, from Paitingfu to Taijaufu. This mapping was the work of Sargent, the topographer of the expedition, one of that group of expert cartographers of the United States Geological Survey. In 58½ days Sargent mapped no less than 8,500 square kilometers, occupying 103 stations, locating 2,600 points by intersection, and measuring the altitudes of 2,150 points."

A. H. B.

"The Negritos of Zambales" is the subject of a recent publication of the Ethnological Survey of the Philippines. The pamphlet is very fully illustrated with maps and pictures showing the customs and life of the little brown people.

Although living in the mountainous and wooded portions of the islands, the Negrito grows tobacco, maize, and vegetables. He usually plants in cleared spots in the forest, because the soil is loose and needs no plowing, as in the case of the lowland. All work of digging up the soil, planting, and cultivating is done with sharpened sticks of hard wood, sometimes, but not always, pointed with iron, for iron is scarce. The piece of ground for planting is regarded as the personal property of the head of the family which cleared it. No one else would think of planting on it, even though the owner had abandoned it, unless he declared that he had no more use for it.

Many of the vices of the Negrito, says the report, are due to contact with the Malayan, to whom he is, at least in point of truthfulness, honesty, and temperance, far superior.

While living in the wild state, they have a very simple form of government. They simply gather around the most powerful man, whom they are quick to recognize in this way for superior ability or greater wealth; but when living peaceably scattered through the mountains each head of a family is a small autocrat, and rules his family and those of his sons who elect to remain with him. When he dies the oldest son becomes the head of the family.

DECISIONS OF THE U. S. BOARD ON GEOGRAPHIC NAMES

April 5, 1905

CHINESE PROVINCES

Anhui (not Nganhwei, Ngan-hwei, Ngan-hoei, Ngan-hui, Ngan-hwuy, nor Ngan-Hwuy).
Chehkiang (not Cheh-kiang, Chekiang, nor Che-kiang).
Chihli * (not Pechili, Pe-chili, Pe-chi-li, Chih-li, nor Chi-li).
Fuhkien * (not Fukien, Fu-kien, Fuh-kien, nor Foo-kien).
Honan (not Ho-nan).
Hsin chiang (not Eastern Turkestan nor Kashgaria).
Hunan (not Hu-nan nor Hoo-nan).
Hupeh (not Hu-peh nor Hoo-pe).
Kansu (not Kan-su, Kansuh, nor Kan-soo).
Kiangsi (not Kiang-si nor Kiang-se).
Kiangsu (not Kiang-su).

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* Penck, Prof. Dr Albrecht: The Investigations in China by the Carnegie Institution. Die Zeit, Wien, April 15, 1905.

* Revision of previous decision.

Kuangsi (not Kwangsi, Kwang-si, nor Quang-se).

Kuangtung (not Kwangtung, Kwang-tung, Kwantung, Kang-tung, nor Quang-tung).

Kueichou (not Kui-chou, Kweichou, Kwei-chow, nor Quei-chow).

Shangtung (not Shantung nor Shan-tung).

Shansi (not Shan-si nor Shan-se).

Shensi (not Shen-si nor Shen-se).

Ssuch'uan (not Szechuen, Sze-chuen, nor Sze-chuan).

Yünnan (not Yunnan, Yun nan, nor Yun-nan).

Mukden; city, China (not Mookden nor Moukden).

Banka; island, lying between Sumatra and Borneo (not Banca nor Bangka).

Captains; bay, Alaska, between Iliuliuk Bay and Nateekin Bay.

Carquinez;* bay, point, and strait, connecting Suisun and San Pablo Bays, California (not Carquines, Karquines, nor Karquenas).

Chouteau;* county, Montana (not Choteau).

Dona Ana;* county, post-office, railroad station, and precinct, New Mexico (not Donna Ana nor Doña Ana).

Grass; river, tributary to the St Lawrence River, St Lawrence County, New York (not De Grasse, Grasse, nor La Grasse).

Iliuliuk;* harbor, Alaska, an arm of Unalaska Bay, east of Dutch Harbor (not Unalaska, Captains Harbor, nor Levashef).

Le Conte; bay and glacier, east of Mitkof Island, Frederick Sound, southeastern Alaska (not Hutli, Hnlti, nor Thunder).

Lewis and Clark;* county, Montana (not Lewis and Clarke).

Little Salmon; stream, tributary to Lake Ontario, near Texas and about 4 miles west of Salmon River, Oswego County, New York (not Salmon).

Port Levashef; port, Alaska, at head of Captains Bay (not Captains Harbor nor St Paul).

Sycamore; creek, tributary to Verde River from the northeast, Yavapai County, Arizona (not Dragoon nor Dragoon Fork).

May 3, 1905

Chefoo; city, China (not Chifu, Chi-fu, Chefoo, Chee-foo, nor Tschi-fu).

Liaoyang; city, China (not Liau-yang, Liao-yang, nor Liaoyan).

Tieling; city, China (not Thieling, Tie-ling, nor Tielin).

American Corners; village, post-office, and district, Caroline County, Maryland (not American Corner).

Hinchinbrook; principal entrance to Prince William Sound, southern Alaska (not Meiklejohn).

* Revision of previous decision.

Choga; creek, Macon County, North Carolina (not Chogee).

Hughes; post-office and railroad station, Butler County, Ohio (not Hughs).

Indian; creek, Chowan County, North Carolina (not Dillard nor Dillard Mill).

Marshyhope; branch of the Nanticoke River, Dorchester and Caroline counties, Maryland, and Kent and Sussex counties, Delaware (not Marshy Hope, Marsh Hope, West Branch of Nanticoke River, West or Northwest Fork of Nanticoke, nor Northwest Prong of Nanticoke).

Norris; glacier on the west side of Taku Inlet, southeastern Alaska (not Kadischle, Kadishle, nor Windom).

Salt Lake City; city, capital of Utah (not Salt Lake).

Santeetlah; creek and post-office, Graham County, North Carolina (not Santeetla nor Santutlah).

Shewbird; post-office and mountain, Clay County, North Carolina (not Shoo Bird nor Shoobird).

Shoshone; established for all place names, but not for tribal name or reservation.

Taku; glacier at the head of Taku Inlet, southeastern Alaska (not Klumū Gutta, Klumma Gutta, nor Foster).

June 7, 1905

Donaldson; creek, Caldwell County, Kentucky (not Dollison, Dollarson, nor Donalson).

Hayden; island in Columbia River, Multnomah County, Oregon (not Shaw's, Shaws, nor Vancouver).

* Horniblow; point, Chowan County, North Carolina (not Hornblower, Horniblow's, nor Skinners).

Kivalina; river, debouching in Corwin Lagoon, on the Arctic coast of Alaska, 60 miles southeast of Point Hope (not Kevulik, Kevuleek, Kuveleek, Kivalena, Kivalinagmiut, Kiveleena, Kivilenya, Kivelow, nor Kiv-a-linyah).

Kobuk; river in northwestern Alaska tributary to Hotham Inlet (not Kowak, Putnam, Kooak, Kubuk, nor Kuvuk).

Poverty; point, Dorchester County, Maryland (not Brockman, Brokman, nor Brohawn).

Roasting Ear; point, Dorchester County, Maryland (not Roasting Gar nor Rose Neck).

Tigari; Eskimo village on Point Hope, Arctic coast of Alaska (not Tikira, Tik-i-ráh, Tik-i-ráh-mūn, Tikirak, Tik-è-rá, Tikera, Tiekagagmiut, Tiekaga, Tigera, Tig-a-ra, Tig-a-rah, nor Figarok).

Whale; island, between Afognak and Kodiak, Alaska (not Tobopymeriū, Tobopymek, Ketoy, nor Kittiwake).

*Reversal of previous decision

Earthquakes. By Clarence Edward Dutton, Major, U. S. A. Pp. xxiii+314. 8½ x 5¾ inches. New York: G. P. Putman's Sons. 1904.

This volume, by a specialist, gathers up in a technical way the most important results of the new seismology which has developed within the last third of a century chiefly under the leadership of Prof. John Milne, an Englishman who taught science for several years in the Imperial University of Japan. These investigators confine themselves largely to the study of the wave motions in the earth, looking on earthquakes as an effect of geologic forces. Our author treats of the nature and causes of earthquakes, describes the instruments used for recording vibrations, and discusses the views and theories of observers based on this mechanical data. He also points out the chief areas of these disturbances and gives a final chapter on seaquakes. He draws illustrations from the various quarters afforded by these phenomena and makes copious use of pictures and diagrams. There is a short index. The volume is indispensable in its field, as it practically has no rival, but it is not intended for the general reader, though a man of ordinary education can readily get considerable information from it. C. M.

Thomas Hutchins. A Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina. Reprint of original edition of 1778. Edited by Frederick C. Hicks. Pp. 143, with maps. Cleveland: Burrows Bros. Co. 1904.

This reprint of a rare and valuable book will be welcomed by all students of the formative period of the United States, and the work of the only man who filled the office of civil "geographer of the United States" should be of interest to every student of geography. Mr Hicks supplements the reprint by valuable notes, and contributes an excellent biographical sketch of Hutchins, with a list of his works. He was not merely an American by birth, but in his sympathies and activities, resigning his commission in the British army to serve his country during the Revolutionary War. To Hutchins is probably due the system of land platting used by our General Land Office. He also exercised a potent influence on colonization through his extensive travels, road surveys, and land tracts. During his services as geographer, as one of the commissioners to run the boundary line between Pennsylvania and Virginia, and also between New York and Massachusetts, and in establishing the system of surveying public lands, Hutchins displayed conspicuous scientific ability.

Prof. Hicks says that "his geographical works formed the basis for the famous American geography of Jedidah Morse," and adds that "as a pioneer, soldier, patriot, surveyor, litterateur, and scientist, we find him to have been . . . a man who justly is entitled to a place among the great American civilizers." A. W. G.

Geographen Kalendar, 1905-1906. By Hermann Haack. With 16 maps. Pp. 530. 4½ x 6½ inches. Gotha Justus Perthes. 1905. $2.50.

The volume for 1905–1906 of this useful geographical annual contains a summary of geographical progress in 1904 by Professor Paul Langhaus, a review of geographic publications in 1904, a directory of the working geographers of the world, and a series of admirable small maps, including maps showing the route of the English Tibetan expedition, the Baikal railway, Siam, the Signal Corps telegraph lines in Alaska, French explorations in Sahara, and maps picturing the territorial expansion of the United States and Japan. The map of the United States is in error, as it represents Arizona, New Mexico, Oklahoma, and Indian Territory as states. The directory does not contain the names of a considerable number of American geographers, who ought to be included.

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VOL. XVI, NO. 8 WASHINGTON AUGUST, 1905

THE NATIONAL GEOGRAPHIC MAGAZINE

THE PHILIPPINES*

BY THE SECRETARY OF WAR, HON. WILLIAM H. TAFT

WHEN your veracious committee came to see me to invite me to address the National Geographic Society I gathered from what they said—possibly they did not say it directly—that I was to have the pleasure of sitting and talking in a parlor with a few ladies and gentlemen much interested in geography and the far countries of the world; who would not require a speech or lecture, but merely an informal talk. I said to them that my engagements at present were such as to make it altogether impossible for me to prepare anything which would be worthy of an august audience. They said, "That is entirely unnecessary. Talk about the Philippines, you know all about that, and you can talk that in a parlor without difficulty." And so I did not know until this morning, when I was advised where I would find the Rifles' Armory, that I was to speak to so intelligent, and, I may be permitted to say, "terrifying" an audience as this. I make this explanation both because of the desultory character of the remarks which you shall hear, and also to avoid the charge which I am constantly receiving at home from my wife and my mother, whose instructions I hope to follow, that I should not harp on one string so much.

Those who are responsible for the Philippine administration under this government have had the disadvantage, or advantage, of being subject to criticism ever since they began, on all sides. For a long time—if I may designate what they said by so opprobrious a term—the "noise" came from the anti-imperialists, and we were attacked for oppressing a people struggling for independence. We were attacked, after we had taken control, for not giving at once to that people all the liberties they were entitled to. We were attacked for proposing to stay any number of years there in order to enable that struggling people to get upon their feet. When it was suggested that we should stay and educate them, it was said to be altogether too long.

Well, we have fought out that fight, if I understand it, with the American people, and that people, being a sensible people, have decided that, so far as the issue raised by the taking of the Philippines and our establishing a government there are concerned, those issues are settled; and therefore we may properly turn to the critics whom, with deference for the anti-imperialists of Boston and elsewhere, I regard as much more formidable, the critics who found what they have to say in derogation of our government upon the experience of the greatest colonial government of the world—the British Empire; and we find, curiously enough, or perhaps not so curiously, though, when you come to consider the facts, that the very things for which we are attacked by the anti-imperialists in the Philippine government are made the only basis for approval on the part of the British critics. And in what I have to say tonight I should like to take up, not in very great detail, but subject by subject, the grounds for the criticisms of the Philippine government which have appeared in publications of the British critics.

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*An address before the National Geographic Society, May 5, 1905

The first one of these, who is hardly worthy of notice, yet I do notice him for the purpose of saying one or two severe things about him—he deserves it—is Mr John Foreman. Mr John Foreman published a book upon the Philippine Islands before they came under the American regime that, on the whole, furnished the most material and possibly the best information, the most accurate information, although there were a great many inaccuracies in it, concerning the Philippine Islands. He left the islands, it was said, because of some strictures which he made upon the Spanish friars, and did not return there until long after the Americans had established a government. Then he made a very summary visit, and returned last summer in time to publish an article in the *Fortnightly Review* on what the Americans had done in the Philippines.

I suppose that the editors of that very reputable review permitted the publication of the article because Mr Foreman had established a good reputation by the book which he had published; but no one can read it, and read between the lines, without perceiving the bitterness and utter irresponsibility of the criticisms which he made upon the present condition of affairs in the island. He must first, although professing to hold in the greatest contempt those who were struggling for independence in the islands, have made his home with irreconcilables, for he gave credence to the very wildest statements concerning the government which I am in a position, having formed a part of that government, to be able to deny without hesitation. He had an insinuating way of saying, for instance, "The government is now taking up the work of the Spanish government, proceeding with the harbor works, which will bring into use 160 acres of valuable lands just below the Malecon drive, for warehouses and other purposes. This will doubtless be appropriated by the Americans in the government service." He had no foundation, so far as I know, for saying that the lands would be disposed of except at public auction, and it is a gratuitous insult to any one connected with the government to suggest that those of us who are connected with the government would divide these lands between us.

Now, I pass Mr Foreman by with the statement that the character of his article entitles him to be classed in the category of those "European waifs" who are found upon the shores of the Orient. We had in Manila a collection of persons from America and Europe, and all along the shore between, attracted there by the disturbed condition of the country, whom it took us two full years to eliminate, and when they found the police force of Manila growing more and more strict in its regard for the presence of good individuals and the absence of bad individuals, they took up their march, or their swim, or their sail up the coast, and they put in at Shanghai, which seems to be the final home of all the ocean waifs of the

Orient and of most of the Oriental liars; and they, becoming established there, became very well known in Manila in my time as "Shanghai roosters." They occupied most of their time in libelling the American government. I am bound to say that Mr Foreman has established his claim to take a position on that roost.

The next of these British critics is Mr A. R. Colquhoun, a gentleman of a very different order from Mr Foreman, if we may judge by the writings of the two. Mr Colquhoun has been the correspondent of the London *Times*, was at one time in the colonial service of Great Britain, was the district governor, or commander, of a district in Burma, is a gentleman in every way, and has written two very interesting books—one "The Mastery of the Pacific," and the other "A Greater America." Mr Colquhoun traveled with the commission when we were establishing civil governments in the islands. He was about three weeks in the islands at one time, and about ten days at another. I have a great respect for him, and read what he had to say with keen interest. I shall not take up what he had to say, because what he has had to say has been amplified and treated with more elaboration, and possibly with more authority, by another Englishman or Scotchman, Mr Alleyne Ireland, now connected with the Chicago University, and whose experience in the investigation of tropical colonies makes what he says worthy of consideration, and makes it, also, most interesting.

THEY SAY WE ARE SPENDING TOO MUCH FOR EDUCATION

Now, his first criticism of the Philippine government is that it has devoted three million dollars a year, or at least 25 per cent, and perhaps more, of its total revenue, for education, and he says that that money would be much better expended in the construction of roads and in the material development of the country. He says this because experience in English colonies makes him think that the Filipino needs material development much more than he does mental development, by no means admitting, however, that he has mental development sufficient to dispense with any of it. Upon this subject those of us who are responsible for the course pursued in the Philippines must take issue. The question as to which is right of the two policies depends upon and goes back to the purpose of the colonization. We blundered into colonization; we did not go into it with malice aforethought. We found ourselves in possession of the islands because we could not help it, and then we determined that we would do the best we could with them, working out a policy as nearly consistent with the principles of our own government as was possible. Now, then, that means in the end a government of the people, by the people, and for the people; but a government of the people, by the people, and for the people is absolutely impossible unless you have the great body of that people with intelligence enough to exercise the strong public opinion that is necessary to sustain and restrain any popular government. If it be true, as Mr Ireland says, that tropical peoples are incapable of self-government and incapable of education up to self-government, then I agree that the argument is with him And he assumes as the basis of his argument the experience that the English have had in their colonies.

OUR COLONIAL PROBLEM IS ENTIRELY DIFFERENT FROM ENGLISH COLONIAL PROBLEMS

Well, you judge of how experience ought to lead you in your conclusions by how far that experience has gone. I am not aware as yet of any attempt on the part of England to try the peoples of tropical colonies in self-government or to educate them up to the point where they may be capable of self-government. Again, experience is useful as the experience is in accord with the conditions which you expect to meet and to which you expect to apply that experience. The peoples that the English have had to handle in the tropics have been the Mohammedans and the Hindoos. They are a people whose religion is so deepseated that it is impossible to hope that they may ever in any great numbers be made Christians. The Mohammedans look with disdain on Christianity as an older religion. They have a new patent, and therefore they look with contempt on European ideas and on American ideas. Now, in the Philippines we have a very different condition of affairs. We have 6 millions of people, nearly 7 millions, who are sincere Christians, and who have been so for 250 years. They are Christian children because they have been brought up by the friars, who thought that it was unwise to expose them to the temptations and demoralizations of the Spanish or any other world. But they did instill in them the principles of Christianity, and they did turn their faces, their minds, and their ambitions toward Europe and toward America. It is from these two countries that these people derived their ideas. Therefore I think that we are right in saying that experience founded on dealing with Mohammedans and Hindoos in respect of popular self-government may be doubted as an absolute guide as to what we may expect to do with people who are the only Christian Malays and the only far-Oriental Christians.

Another objection which may be made to the education of these people is that if you educate them you will educate some of them so that they will become unruly; they will become constant revolutionists, and you will always have trouble. Well, I agree that it is possible to educate a man much beyond his capacity, so that he uses his education for purposes for which a man of much less education would not waste it. But the advantage and absolute necessity in a popular government of having public opinion that comes from a widespread intelligence, not profound, not university, but based on primary education, furnishes an antidote for the poison of the revolutionary tendency of light-headed, irresponsible characters.

You can tell often whether a people are fitted for education by whether they take to it or not. We have in the Philippines a much severer struggle to teach the Filipinos than they would have in the Malay states, or in Java, or in India, because we have a people who have no common language that is fit to be used by a civilized people, and therefore we have not only to teach them, but we have to teach them a different language from their mother tongue. There are some twelve different dialects or languages in the Philippines among the civilized tribes, and until they shall have a common language, it is hopeless to expect solidarity as a nation or intelligence as a people. Therefore we determined that we ought to teach them English. It is true that they had learned, some of them—about 7 per cent of them—Spanish, but they did not look to Spanish as a language which they cherished. Spanish is not the language of the Orient. Spanish is not the language of free institutions, and we concluded that as the question was only between teaching 93 per cent and 100 per cent we might as well do the job thoroughly and teach them English.

ARE WE FORCING ENGLISH DOWN THEIR THROATS AS WITH A FORCE PUMP?

Now, our anti-imperialist friends say, and I think that even the president of Cornell University has intimated, that we are forcing English down the throats of an unwilling people as with a force pump. As a matter of fact, the teaching of English began before civil government reached the islands; the instinct of the Americans whether they wear a military uniform or the garb of peace, to teach the youth how they should grow and to spread intelligence, led the army into the establishment of an educational system in the Philippines, and in every company of that army two or three men were detailed right in the villages where insurrection was rife to open schools and teach the little Filipinos English. Of course, it was a defective school system, but nevertheless we found it there, and on what they had done we builded. We sent to America for a thousand school teachers, and we organized, and as the army pacified the islands we followed closely with civil government and with schools. Now, we had at the end of the first year after we reached there organized schools enough so that there were reciting in English 10 per cent of the youth of school age of the islands. The next year this was increased to 13 per cent, and last year it increased to 19 per cent, and there were in July and August of last year reciting in English in the schools 263,000 Filipino youth.

We do not have any compulsory school laws, because a compulsory school law is predicated on your having schools and teachers enough to teach all the youth in the community, and we have, as you see, only about one-fifth of the teachers needed and only one fifth of the school-houses needed. That is what we are doing now. Next year I have no doubt the increase will be 100,000. And all this indicates to you—at least it does to me—the earnest desire of those people, those children, and the fathers and mothers of those children that they should learn English, and that they should become educated. Now, there are 263,000 of them, and the average attendance is 70 per cent. That country is a country where between doing a thing and not doing it you usually choose not to do it, and therefore if 70 per cent of the pupils attend you may count on a very strong feeling in favor of education everywhere. The trouble is that we have not money enough to make their education what it should be. We do not want to make them university professors. We shall have a university there. We ought to have one simply as a keystone for the arch of education for a comparatively small number of Filipinos who can afford to take that education; but what we wish to do is to spread the primary schools, the manual-training, industrial, and normal schools. We are now using 800 American teachers, in the first place, to teach the Filipino teachers how to teach their Filipino children. In other words, we are hoping to build up a body of from ten to fifteen thousand Filipino teachers who can teach English, and thus teach the whole islands a new language—a common language and a language, as I have said, of free institutions. Now, it seems to me that this statement of mine, this statement of fact, itself answers my friend Mr Alleyne Ireland as to the wisdom of our expending 25 per cent of our income in teaching. It is what the people want, and we can be certain that if they learn the English language and read English books they will learn.

OUR SYSTEM OF GOVERNING THE PHILIPPINES IS DESIGNED TO TRAIN THE PEOPLE TO SELF-GOVERNMENT

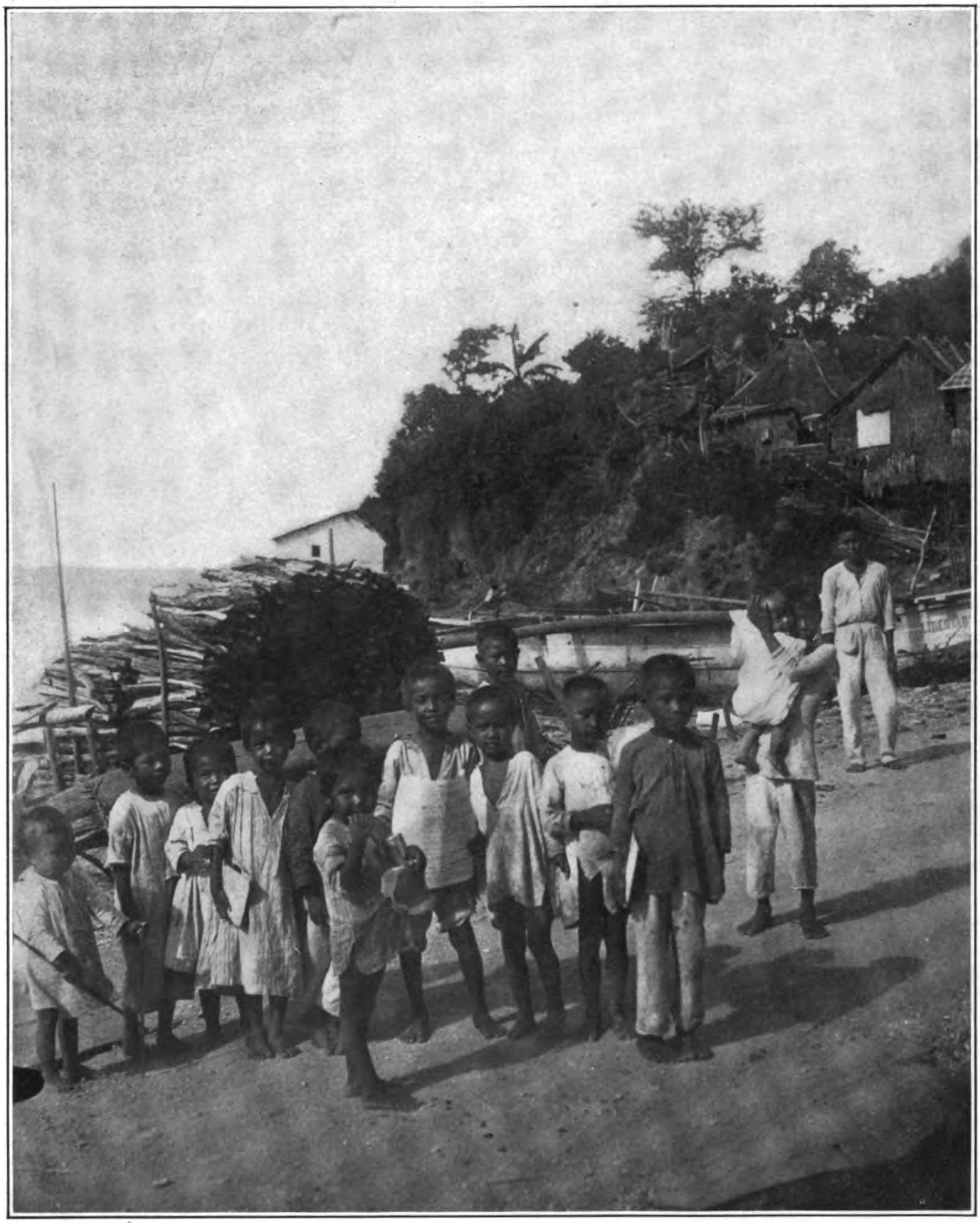
Now, the next subject of criticism is as to the form of government. Mr Ireland says that we have made a mistake, because we have established municipal and provincial governments under the commission. We have had elective officers in the municipal governments; we have had an elective governor, who is one-third of the provincial council, the other two members being appointed under the civil-service rules and being, generally, Americans, the "fiscal" or prosecuting attorney being a native and the secretary of province being a native. He says that that makes too many officers; that we would get along a good deal better if we followed the English custom of having one English commissioner, who acts as judge, as executive, as legislature, as everything else, and has under him natives who are intelligent enough to understand his commands and carry them out. Now, it is perfectly true that that government there could be much more efficient if we put an American in charge of every province and made him absolute ruler there. It would not be any trouble to do it at all. We would have less taxes, the work would be attended to with more care, and, on the whole, for the next ten or fifteen years it is probable that the people would be in better condition, but they would not have any responsibility about the government. They would not be subject to scolding at every mouth by the officers above them, they would not find out what it is to be responsible for the government of others, and they would not be enjoying the education or partial education—or, rather, an education in partial self-government—which our system gives them. It adds to the expense and it does not give them so good a government, and therefore, if our policy were only the best for the time, I should yield to the criticism of Mr Ireland. But what we are trying to do is to teach these people by object lessons, as well as by direct education in the primary schools, what it is to be a free people.

The idea that freedom can be enjoyed by a people without learning how to enjoy it is something that belongs to theory, not to practice. It may be found in Boston, but nowhere else.

I ought to add that this system of government was most useful in bringing about peace, in satisfying the natives that we were there with the idea of giving them as much self-government as we could. Mr Ireland and the others who criticise ought in fairness, it seems to me, when they consider what is done there, to put themselves more or less in the position of those who had to do the job and to take into consideration those difficulties that present themselves on every side. We said that we were there for the benefit of the Filipino people ; we said that we were there to give them as much of self-government as they could stand, and we did it. We may have given them a little more, but it is a good deal better to extend it a little beyond what they can stand and teach them the lesson and then say to them, "When you do educate yourselves up to this we will extend it a little more," as we have had occasion to do in a number of provinces, than it is to give them the impression that we were deceiving them in what we said we wished to do for them. One of the chief characteristics of the Orientals—indeed, one of the chief characteristics of all nations that are ignorant—is suspicion and distrust, and the primary rule of policy in dealing with them is absolute honesty and straightforwardness.

BUILDING ROADS

Now, Mr Ireland says that there is a woeful lack of improvements in the Philippines, especially in the matter of roads, and then he refers to the roads of the Roman Empire. Those roads have been made the basis for many an oratorical period, without knowledge as to how many years, how many decades, and how many centuries it took to construct them. But it is true that roads are a most important feature of civilization. Intercommunication is what helps, as much as education itself. We began our career as legislators in the Philippines by voting a million dollars to be expended by General McArthur in the construction of roads in the Philippines, and we have been trying to build them ever since. Well, there are 3,000 islands there. There are 140,000 square miles. A great many of the



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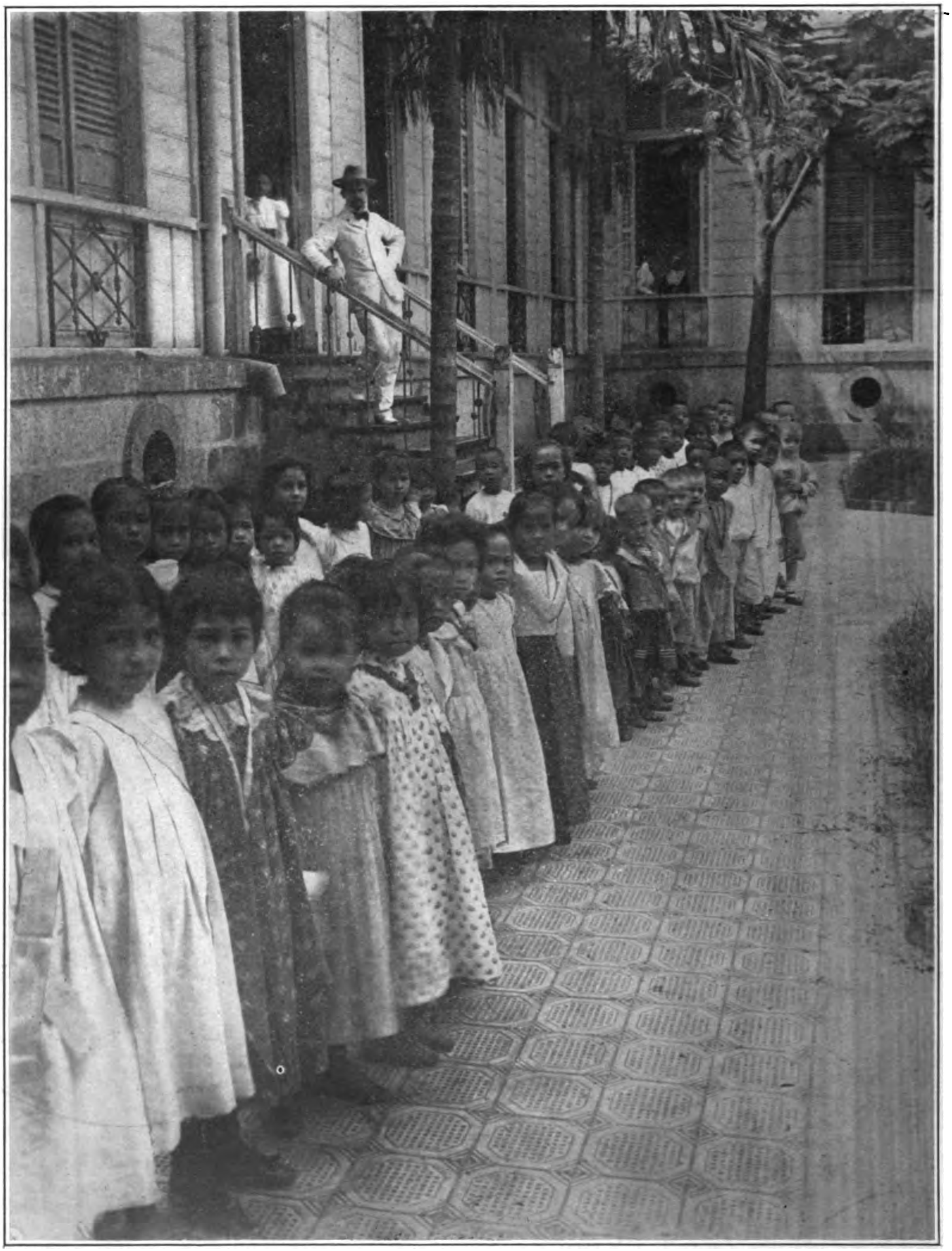
Young Filipinos



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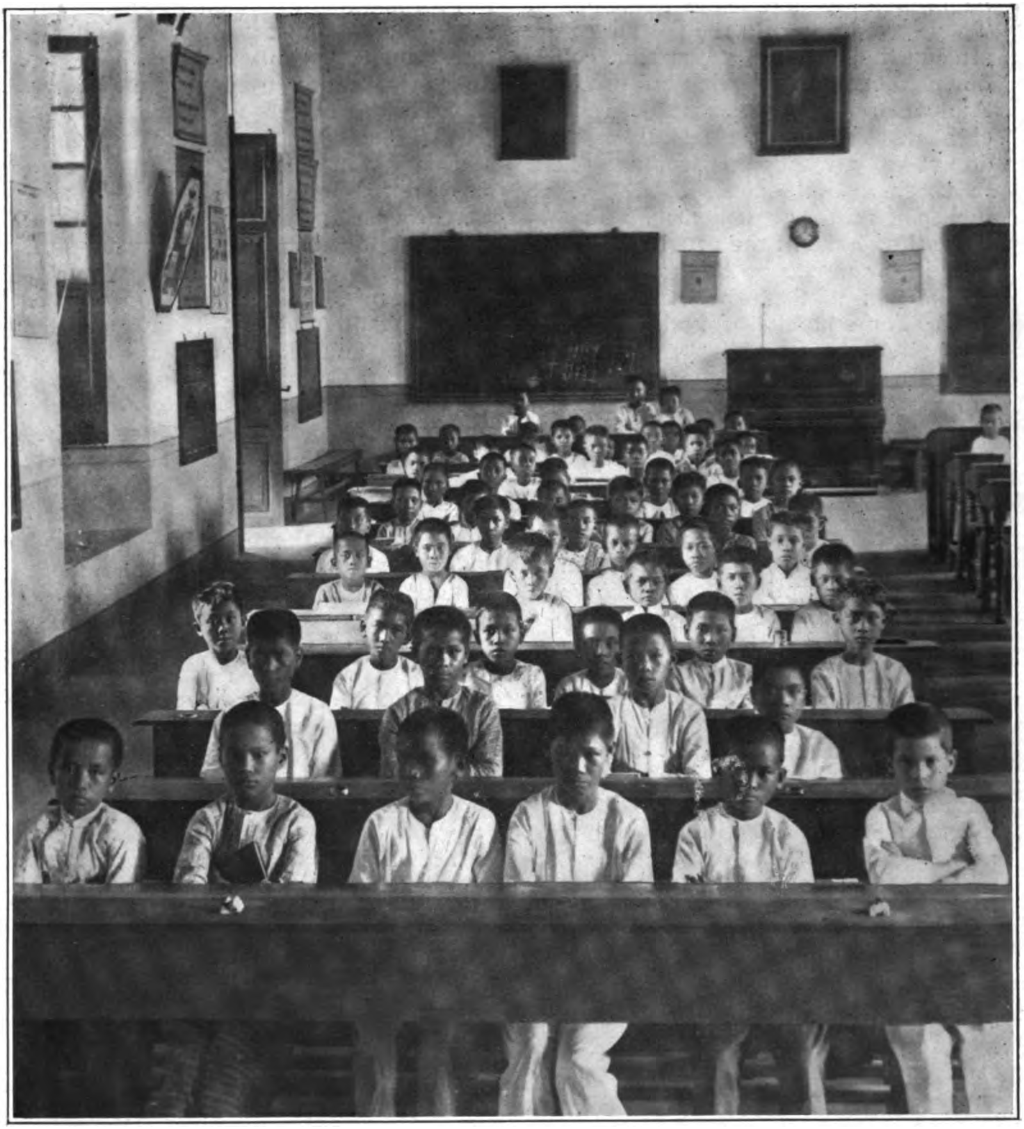
Primary Pupils in a Municipal School, Manila



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The Right Road to Filipino Freedom

Boys in the Normal High School, Manila

provinces lie in the low land, where there is no rock which can be used to be broken up and made good metal. They have to go into the bottom of the streams and get the gravel that comes down from the mountains and use that. And then we have, sometimes, six or eight months of torrential rains. You do not know what rains are, living here in the temperate zone. Think of 52 inches of rain in one month! That is what they have in the province of Benguet in the month of August.

And then take another feature of the civilization which we found there. It would seem as though Providence or nature were playing a joke. The roads are very hard to construct; but the natives, in order to make it still harder to preserve them, use wooden wheels for their carts and shave them down on the edge. They are solid wheels, and they shave them down to a knife edge, and then load the wagons and take them in this rainy weather over the roads. Well, the wheels cut as a razor would cut your finger, and this plays havoc with the roads. We attempted to cure that by imposing a fine of five dollars on every wagon that had a tire less than 2½ inches broad. But they concluded that this was only for taxation, and they paid the tax and continued to use the wagons. And then we had to import wagon wheels to show them what we meant, and we imposed a fine-and-imprisonment penalty for the use of the wagons with narrow-tired wheels.

Of the three millions of dollars which was voted by Congress part of it was expended in order to break up a corner in rice, which promised to be a rice famine, and two millions of it were spent in the construction of roads. Those roads are not all completed yet. You know that when you go through a tropical jungle with engineering instruments it is not so easy a matter as in this country, where you can see a long distance ahead, and the very work of laying out a road is a long one, taken with the difficulty of getting the material for making a permanent road. All road building must go slowly. Therefore when a gentleman goes along on an inspection tour in the *Princess Irene*, or one of those beautiful vessels of the Hamburg Steamship Company, and lands in India at Bombay, and drives out and sees those beautiful roads all through India, that have for 250 years been building, and then comes to Ceylon, where they have for so many years been building roads under the Dutch and English, and then comes to Singapore and into the Confederated Malay States, where they do not have any taxes, because they raise so much money out of the three-quarters of the tin product of the world that they get out of the mines there—they have been 50 years building roads—and then comes here to the poor Filipinos and finds that roads have not been constructed on every one of the 100 islands, and that the roads that have been constructed show signs of the previous year's torrential rains—it is a little difficult for a critic, however impartial, not to think that the government is very much to blame for not having constructed all those roads through all the islands as they ought to be, and as I hope some day they will be constructed, both for the peace of the islands and for the uplifting of the population. But meantime we are doing what we can.

NEW HARBORS, A PURE WATER SUPPLY, AND RAILWAYS

Well, to begin with, we have united Manila with every one of the 44 provinces by telegraph lines, and this is an opportunity for the spread of information and intercommunication. We have very good postal facilities. We have just opened 33 miles of street railway in Manila, and that a modern street railway. Manila, for its population, had more teams and more horses and vehicles, I suppose, than any other city in the world. They were not very large horses and they were not very commodious vehicles, but such as they were they traversed the streets, and they were an absolute necessity, because everybody rides in Manila except the very poorest and humblest. In no other city in the world was a street-railway system more needed than in Manila, and I have no doubt that its presence there today—and it has begun both with great enthusiasm on the part of the people and on the part of the gentlemen who look forward to dividends from the franchise, given about a month ago—I have no doubt that the presence of that street railway will reduce the cost of living of the people of moderate incomes 25 per cent because of the absolute necessity of getting about and the opportunity of disposing of the horses and carriages and the necessity of feed and all the other expenses attendant upon the keeping of horses and carriages.

We are engaged in the expenditure of 6 millions of dollars in the harbors of Cebu, Manila, and Iloilo, and we shall probably have the best harbor in the Orient at Manila. People who are not familiar with the islands suppose that the Bay of Manila affords a harbor; but the Bay of Manila is 30 miles long and about 25 miles wide, with a 6-mile entrance at Corregidor which offers a full sweep to the southwestern monsoon, which comes in for six months in the year, which makes it impossible, especially in the afternoon, to land from boats that do not get behind a breakwater. This harbor is to be shut off from the wind by large breakwaters. It is very nearly completed. We are to have wharves, alongside of which the largest vessels can come, and, as I have said, 160 acres are to be reclaimed for the construction of warehouses and for business purposes of the city.

We are just putting in—just advertising the bonds for, have the plans for, and are just about to put in—a sewer system in Manila. Manila is about seven feet above the ocean—it does go up to about 10 feet—and you cannot sink a hole anywhere without striking water within 3 or 4 feet. That makes the problem of sewerage very difficult, and we have a plan now which involves the pumping of the sewerage away out to sea, so as to rid the city of any danger from it. Mr Desmond Fitzgerald, of Boston, whom we sent for as an expert engineer, has pronounced the plans to be correct.

We have had to go back into the mountains about fifteen miles in order to increase the water supply of Manila and to be sure that we shall get above the region where the water would be impregnated with cholera germs or other undesirable inhabitants. This will cost about two millions of dollars, but we are just now ready to construct it.

We are engaged, under an act of Congress recently passed, in preparing invitations to bid for the construction of a thousand miles of railway in the islands. When we have the thousand miles of railway constructed, so as to open each island to the sea, we shall proceed much more rapidly in the construction of wagon roads, because then we shall have some means by which we can haul road material from one point to another. I would like to dwell on the subject of the railways, but I have not time.

PHILIPPINE CIVIL SERVICE

Mr Ireland criticises, in some detail, the civil service of the islands. Well, I was a civil-service reformer when I went to the islands, and I was determined that we should put in force there as strict civil-service rules on the basis of civil-service reform here as we could, and we did; and nobody can get into the service there now without first passing an examination. But Mr Ireland says that the examination is only up to the standard of the ordinary high-school examination, and he compares it with the examination that a man has to pass to enter the colonial service of Hongkong, China, or Calcutta, India. That is an examination, I should judge from what he says, equal to that a man must pass when he gets the degree of "A. B." at Harvard or Yale. Well, I said to Mr Ireland that if that were the kind of examination we had to put a man through we would not have anybody in the government service of the islands. That is all right for a country that has been 250 years in colonial government, with such a lot of sons anxious to go out somewhere and fit themselves for the service; that has been in the business long enough to establish schools and universities in England, where they directly fit people for the service, and that has been sufficiently long in the colonial service to establish a service where you have a pension, and where a man may look to that service as the service of his life, and as a place from which, at the very reasonable age of sixty or sixty-two years, he may retire on his pension knowing that he and his family will be taken care of. Now, it is possible to get men under such circumstances; and no one has a more profound admiration for the colonial service of England than I have. I know that it is an admirable service, and I wish that we, too, could have such a service; but the idea of talking about our having such a service when we have been in the islands three years, and that we could have a university education as a basis for a complete civil service seems to me to indicate that our brother Ireland shot too far. He did not know how "to restrain himself," as Lord Coke said, "to the fitness of the thing."

IF WE INTRODUCE CHINESE WE WILL HAVE A REVOLUTION

Now, the next issue that Mr Ireland makes is a very serious one—one, I agree, upon which strong arguments can be made upon both sides—and that is the question as to whether we should admit Chinese laborers to the islands to build them up. Mr Ireland says that we have no laborers in the islands worthy of the name, and that if we expect to do anything there we might as well at once admit the Chinese; that they would build up the islands, and that it would be for the benefit of the Filipinos. But I do not think that Mr Ireland looked at the result of that policy as he saw it exhibited at Singapore and in the Straits Settlements, with a full consideration of what it meant to the Malays, who were there before they admitted the Chinese, for he found that all the business and all the work and all the money and all the influence and everything that was worth having was Chinese. There is a superficial appearance of English in the government, but the money and the work and the business are largely Chinese, and our friends the Malays sit around in the park and enjoy the sight. They are relegated to the back bench. Now, then, that is certain to be the case if we admit the Chinese to the Philippines, and the question is whether under our promise to them to govern the Philippines for the benefit of the Filipinos we can afford to bring about a condition in which the Filipinos shall be relegated to the back seat and the Chinamen shall be invited forward to share all the benefit that may come from the development of the rich country.

Another reason why we cannot do it is because if we do we will have a revolution. There is the deepest feeling possible against the admission of Chinese into those islands. There are today about 50,000 of them in the islands, if not more. The reason why the Filipinos do not like the Chinese is this: A Chinaman will come into the islands and he will work for twelve or fifteen dollars (silver) a month—that is, six dollars or six dollars and a half a month. He will save out of that about ten dollars (gold) a month. He does that in some way. I do not know how he does it. He will live there a year, and at the end of that year he will go out of the laboring business and he will set up a store next to a Filipino woman, who is the man of the concern ordinarily and who is the business person of the community among the Filipinos. He will drive that woman out of business within six months. That is the reason why the Filipinos do not like the Chinese there, and that is the reason why, in the history of the islands, if you will go back, there has been massacre after massacre of Chinamen. It would seem, therefore, an unwise political move. But if the development of the country without the admission of Chinamen is impossible, possibly we ought to run the risk of both. Well, now, is it? Mr Ireland says that it is. We have let this very large public work, which will cost from four to five millions of dollars—the construction of the Manila harbor works. We let it, after advertising, to the Atlantic and Pacific Gulf Company of the United States. Mr Mullen was at the head of it, and he came out and looked around. He said that he did not think that the Filipinos were good for anything, and that he would employ Americans and Chinamen and any one else he could get. There are only 50,000 Chinamen in the islands, and they know that no more can come there and they know that that increases their value, and that that makes them more desirable, and then they become less useful, so that they do not make as good laborers in the Philippines as they do at home, where they have to scramble for a living.

MR KRUSI'S METHOD OF GETTING GOOD LABORERS

A gentleman by the name of Mr Krusi came out as vice-president of the company, and he concluded that he would make a different experiment. The company had a big quarry from which they had to take the stone to construct the breakwater. Mr Krusi built a house. You know they can build a house there—such a house as they live in there—constructed of bamboo and nipa palm. The floors are made of split bamboo, and so the floor serves the purpose of both the bed and the floor, and you can see through to the ground 4 or 5 feet below it. Everything is airy and comfortable. Now, that is the kind of house he built for each family. He had a theater, he had a church, he had a school-house, he had actresses, he had a priest, he had a teacher, he had a cockpit, he had a band. The band played every evening, the cockpit was open on fiesta days, the theater was open three times a week, the church was open all the time. Before three months had passed he had 1,500 laborers there, and he had to call the police to keep others away who were trying to get work there. He says that he has never had better labor than he has had in his quarry. He had to employ from 5 to 8 per cent of American foremen—that is, men who would go in—not gentlemen foremen, but men he sent in to help to do the work—to show the men how the work was to be done. He said that he had no trouble whatever, and that the work was much better than it was before.

Well, now, another example: The street railway has just been constructed—33 miles of it—and they have had from 1,000 to 1,200 men at work, and they have constructed the street railway in Manila at a less cost per mile than they could have built it in Washington or New York. That shows that the cost per unit of product of labor is less with the Filipino laborer. So it has been the case with the government works; but it was supposed that because the government paid a little more than the rest that it could get better labor. Now, it is quite possible in this instance, being in and about the city, that they got the benefit of the best labor, and it is quite possible that when you go into the country you will find more trouble in congregating labor; but those instances are enough to demonstrate that Filipino labor is possible of training; that what is wanted is wages enough to attract them and training enough to make them effective; and so, with due respect to Mr Ireland, with considerable personal experience in the matter, I am confident that Filipino labor is capable of development, and that while the islands may develop more slowly with Filipino labor, they will develop much more to the advantage of the Philippine people than if we should admit the Chinamen.

IS OUR GOVERNMENT TOO EXPENSIVE?

And now a serious charge that is made against the government is that it is expensive; and Mr Ireland figures out that whereas Ceylon, Trinidad, the Straits Settlements, and Burma cost only about 27 per cent of the total exports, the cost in the Philippines is 46 per cent. I agree that the cost of the government, under the circumstances, is very heavy. It must be taken into consideration, first, that this proportion is made larger by the exports because of the deficiency of railways in the islands. In those other colonies to which reference is made the proportion of railways to the area is very much greater than in the Philippine Islands. In the Philippines there is only one line of railway, 120 miles in length; so that when we introduce railways 1,000 miles in length we may suppose that the exports will become greater, and that the proportion of the exports will be very much reduced.

But I wish also to call attention to the fact that we have been going only three years; that we have been until three years in a state of war; that our education is 10 per cent of the exports; that our constabulary necessary to restrain disturbed conditions is 6 per cent. Now, the education of these other countries was considerably less than 1 per cent. That we have had because we have so many to control, to build up an island navy which cost us nearly three millions of dollars and costs us upward of six or seven hundred thousand dollars a year to run; that since we have been there we have had a terrible scourge of cholera, which necessitated the expenditure in the health department of a million dollars; that we had the rinderpest, that carried away 90 per cent of our draft animals and reduced the business of producing for the purposes of export.

Now, all these things Brother Ireland does not consider at all in his comparison between these countries of Ceylon, Trinidad, the Straits Settlements, and Burma, all of which have been prosperous, and the Straits Settlements, as I have said, receiving all its income from tin and opium.

I agree that we have too many Americans in the government. You cannot get an American to go 10,000 miles away from home without paying him something and paying him much more than you would pay a Filipino for doing the same work, and we must expect to reduce the number of Americans as the government goes on, and by reducing the number of Americans reducing the total expenditure, because in getting a Filipino who will do the same work as an American you ought to be able to get him for half the price.

Then Mr Ireland criticises severely the treatment of the islands by this country with respect to the tariff, and in that respect I fully concur with him. I sincerely hope that next year Congress will reduce the tariff to nothing on all goods produced in the Philippine Islands, except tobacco and sugar, and reduce that to 25 per cent, merely to justify our putting a duty in the Philippines against you until 1909, in order that the government may be supported and not lose that revenue until that time. And then when 1909 comes, and we are released from the necessity under the treaty of Paris from giving the same privileges to Spain as to the United States, then we can have complete free trade between the islands and America. It is true, as Mr Ireland says, that the Philippines are less developed than any of the colonies to which he refers. It is true that, in a certain sense, the people are less educated. It is true that they are more like children. But it is not true that they are not the best material for self-government. It is true that those islands, the gems of the Orient, have been undeveloped in a way that it is hard to understand unless you read the history of the islands, and then you see that these people were brought up to be children constantly, in order that they might not know the wickedness of the world, and that all development was restrained. Now, may we not hope that under American influence, which shall tend to uplift the islands and at the same time to invest good American and other capital there for the purpose of introducing railways and developing the wealth of these islands that there is in the soil, in the mines, in the forests—may we not hope that in 40 years hence, when Brother Ireland goes around the world again to compare the various civilizations, that a new light will break in on him when he looks at the islands?

FORESTRY ABROAD AND AT HOME*

By GIFFORD PINCHOT

CHIEF OF THE BUREAU OF FORESTRY

EXCEPT China, all civilized nations care for the forest. Until recently the United States ranked nearly with China in this respect, and our country still remains far behind the progressive modern nations in nearly all that relates to the protection, preservation, and conservative use of the forest. Japan has a well developed forest service and a national forest school. In Austria, Italy, and Norway and Sweden government forestry is a well-established portion of the national life. Turkey, Greece, Spain, and Portugal give attention to the forests. Russia, dealing like ourselves with vast areas of forests in thinly peopled regions, but by methods wholly different from our own, is drawing enormous revenues from the systematic care and use of the forests. In Germany the scientific treatment of forests has reached perhaps its highest development. The foresters of France have perfected a most practical and effective general system of forestry, and have created the difficult art of controlling the floods of mountain torrents by planting trees. The Republic of Switzerland, by the use of methods most instructive to citizens of the United States, has developed a type of government forest policy more worthy of our attention and imitation than any other in Europe. In Australia and New Zealand forestry has already made important advances. In Canada the English have made real progress in forestry. The government sells the timber from its forests, but retains possession of the lands and employs fire guards. At the Cape of Good Hope they have an excellent forest service;

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*A chapter from a "Primer of Forestry," part II, by Mr Pinchot, recently published by the Department of Agriculture.

From Gifford Pinchot, Forester

An Exceedingly Productive Spruce Forest in Bavaria

in British India they have met and answered many questions which still confront the American forester, and in a little more than thirty years have created a forest service of great merit and high achievement. The United States has scarcely yet begun.

THE FOREST IN EARLY TIMES

In very early times the forest was preserved for the game it contained. Forestry then meant the art of hunting, and had very little to do with the care of trees. Even the word forest, which really comes from the Latin *foris*, meaning out of doors, was thought in England to be derived from the fact that it was a place given up to wild animals *for rest*. But gradually the forest came to be considered more than the game, and the serious study of forestry began.

MODERN FORESTRY

Forestry as a science is of comparatively recent origin, although a work in which all the European trees are described was one of the earliest printed books. Until the end of the eighteenth century forestry was discussed chiefly by men who were either scholars or practical woodsmen, but who were not both. Then appeared Hartig and Cotta, two men who united these points of view, and their writings are at the base of the whole modern growth of the subject. Both were German. Each covered the whole field as it was then understood, and together they exerted an influence which has not been approached by any other authors since. From Germany their teaching spread to France, and early in the nineteenth century their doctrines were introduced into the French Forest School at Nancy by Lorentz, who, with his successor, Parade, was the founder of modern forestry in France.

Under the feudal system, which was finally destroyed in France by the revolution of 1789, the forest was the property of the feudal lord. In order to make the life of their serfs, who were useful both as taxpayers and as fighting men, easier, and so increase their number, he gave them the privilege of taking from his forest the wood which they required. For similar reasons the wealthy religious houses, like that of the Grande Chartreuse, made grants of land and of rights in the forest. But after a time the number of peasants increased so much that their wants absorbed nearly the whole produce of the woodlands. Then it was found necessary to limit the prescriptive rights to forest product by restricting them to certain parts of the forest, or to make an end of them by exchanging them for the absolute ownership of smaller areas. Thus many of the communities, to which, and not to individual peasants, these rights belonged, came to possess forests of their own. But the communes, as they were called, managed their forests badly, and about three hundred years ago the government was forced to intervene. Under the management of officers of the government forest service the results from the communal forests have been excellent. At present these forests not only supply fuel to the villages which own them, but in some cases they produce enough to pay all the village taxes as well.

GERMANY

Germany still holds the high position in forest science, which began with Hartig and Cotta. The German forest schools, of which there are seven of the higher grades, are still among the very best, and the study of forestry, both in the schools and in the forest experiment stations, is eagerly pursued. The forests in Prussia, Saxony, and other German states are admirably managed and yield important returns. The total value of the German forests, public and private, is said to be about $4,500,000,000.

FRANCE

Forestry in France has long been associated with the names of famous men. Henry of Navarre and his friend and minister, Sully; Palissy, the great potter, who called the neglect of the forest prevalent in his time "not a mistake, but a calamity and a curse for France;" Colbert, the minister of Louis XIV; the botanist Duhamel du Monceau; Buffon, the celebrated naturalist, are among the men to whom France owes the rise and progress of her present excellent forest policy. Their peculiar service was to lay the foundation, both in law and in public opinion, upon which modern forestry in France now rests.

The forests of the French government are admirably managed. They cover only about 2,750,000 acres, but they yield a net return each year of more than $2 per acre. Besides handling their natural forests with great intelligence and success, the French foresters have done much for the general progress of forestry. They developed the art of reforesting denuded mountains, and were the first to plant trees on moving sand dunes along the seashore. More than 150,000 acres of these dunes, which once were blown about by the wind until they overwhelmed great stretches of fertile ground, and even threatened to bury whole towns, are now covered with forests of pine, which produce great quantities of turpentine, lumber, and charcoal.

SWITZERLAND

In Switzerland forestry received attention from very early times. Nearly two hundred years before the discovery of America the city of Zurich began to make rules for the protection and management of the Sihlwald, a forest which it still owns, and which now yields an annual return of about $8 per acre. In the canton of Bern a decree of the year 1592 warned the people against the wasteful use of timber and provided for the protection of the forest. It also directed that for every tree cut down a young one should be planted in its place. It is curious to find this mistaken prescription for the ills of the forest already in fashion more than three centuries ago. To save the forest every old tree must be replaced by *many* young ones.

The first general forest law of Bern was passed as early as 1725. It embodied the most important principles of wise forest legislation as we know them today. But this was only one of a long series of forest laws in which, from the beginning, the idea of the importance of the forest to others besides its owner became steadily stronger. The citizens of Bern have grown ever more willing to place restrictions on themselves for the benefit of the commonwealth.

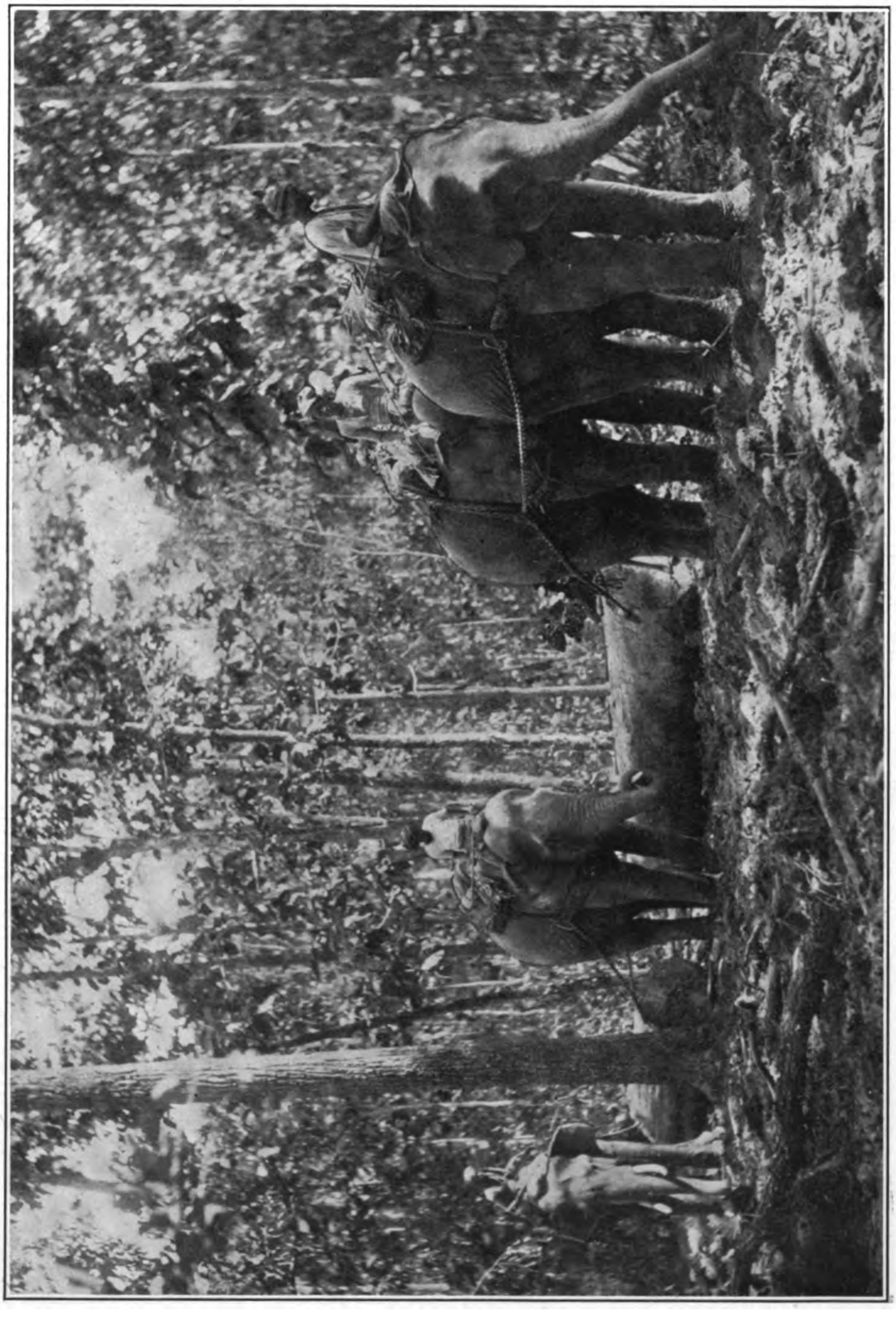
There were great floods in Switzerland in 1834, and they were the cause of a general awakening of interest in forestry. Somewhat later a federal forest commission was appointed. Since the appearance of its final report, in 1861, the progress of forestry in Switzerland has been steady. In 1875 a federal forest inspector was appointed, and a year later the first Swiss forest law was passed. This law does not extend to the whole of Switzerland, but only to the Alps and the steeper foothills. In a country of steep mountains it is of first importance to guard the forests on the higher slopes. Consequently all the forests on these higher lands which serve to protect the lowlands against floods, avalanches, and other similar dangers of wind and weather are put in charge of the Swiss federal forest service.

"Our forest laws," said Elias Landolt, a great and simple man, whose name stands first among Swiss foresters, "are intended to work more thorough instruction, good example, and encouragement than by severe regulations. This method is somewhat slower than one which should involve harsher measures, but the results achieved are more useful and lasting. When forest owners do something because they are convinced of its usefulness it is done well and with an eye to the future, but what they do under compulsion is done carelessly and neglected at the first opportunity. What they have come to learn in this way and have recognized as good will be carried out, and that better and better from year to year."

BRITISH INDIA

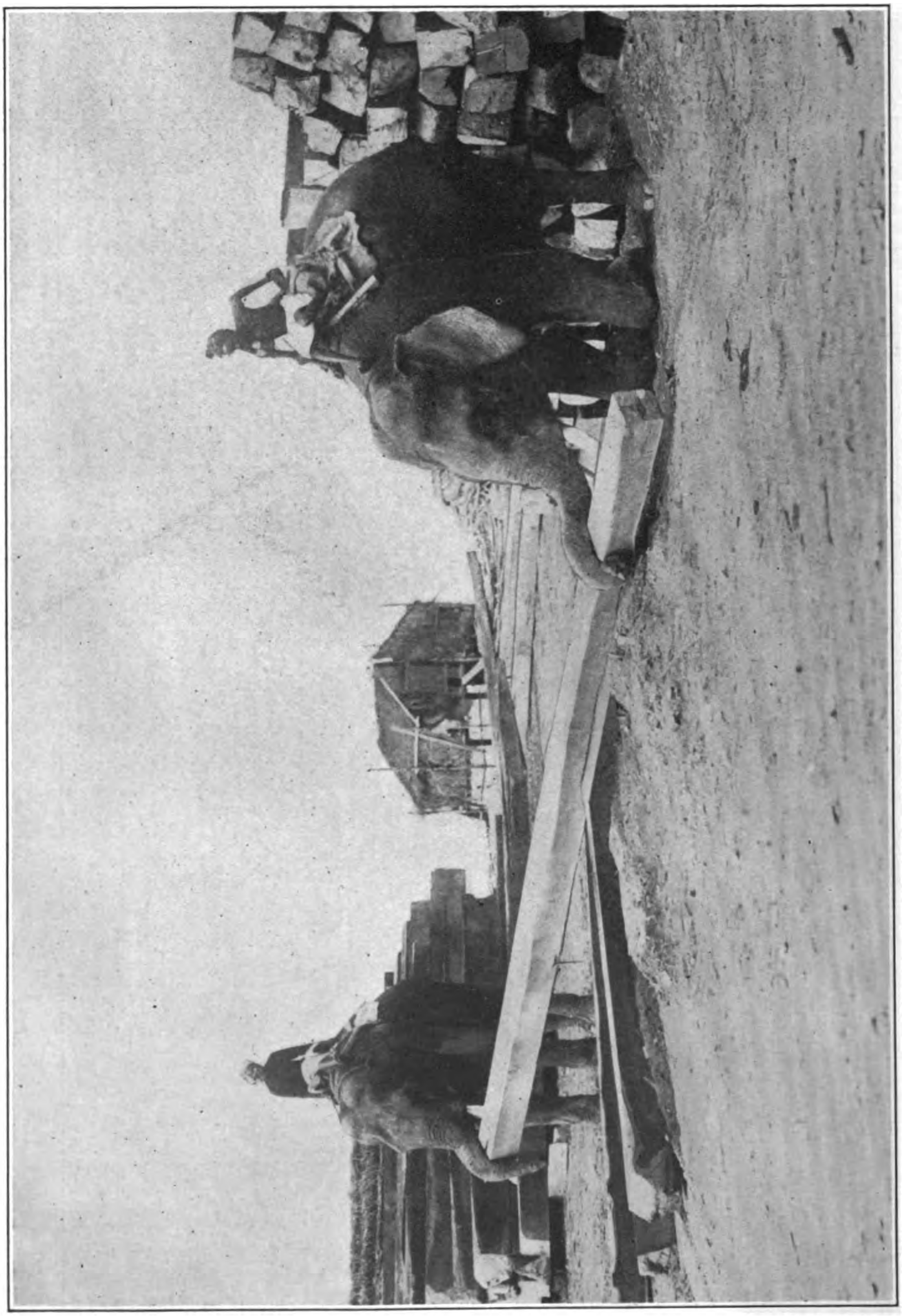
For many years after the British conquest forestry in India made very little progress. Much time was wasted in half measures, until in 1856 Dr (now Sir Dietrich) Brandis was put in charge of the teak forests of Pegu. He acted at once upon the idea of preserving them by making them pay. At first the output of teak had to be somewhat restricted, much against the will of the timber merchants of Rangoon, who protested that the business of their city would be ruined. But after this momentary check the teak trade of Rangoon grew until it was far greater than ever before, and it is now a chief and increasing source of the prosperity of that city.

The appointment of Dr Brandis was the beginning of the Indian forest service. In 1866 he was made inspector general of forests, and from that time progress was rapid. The Indian forest



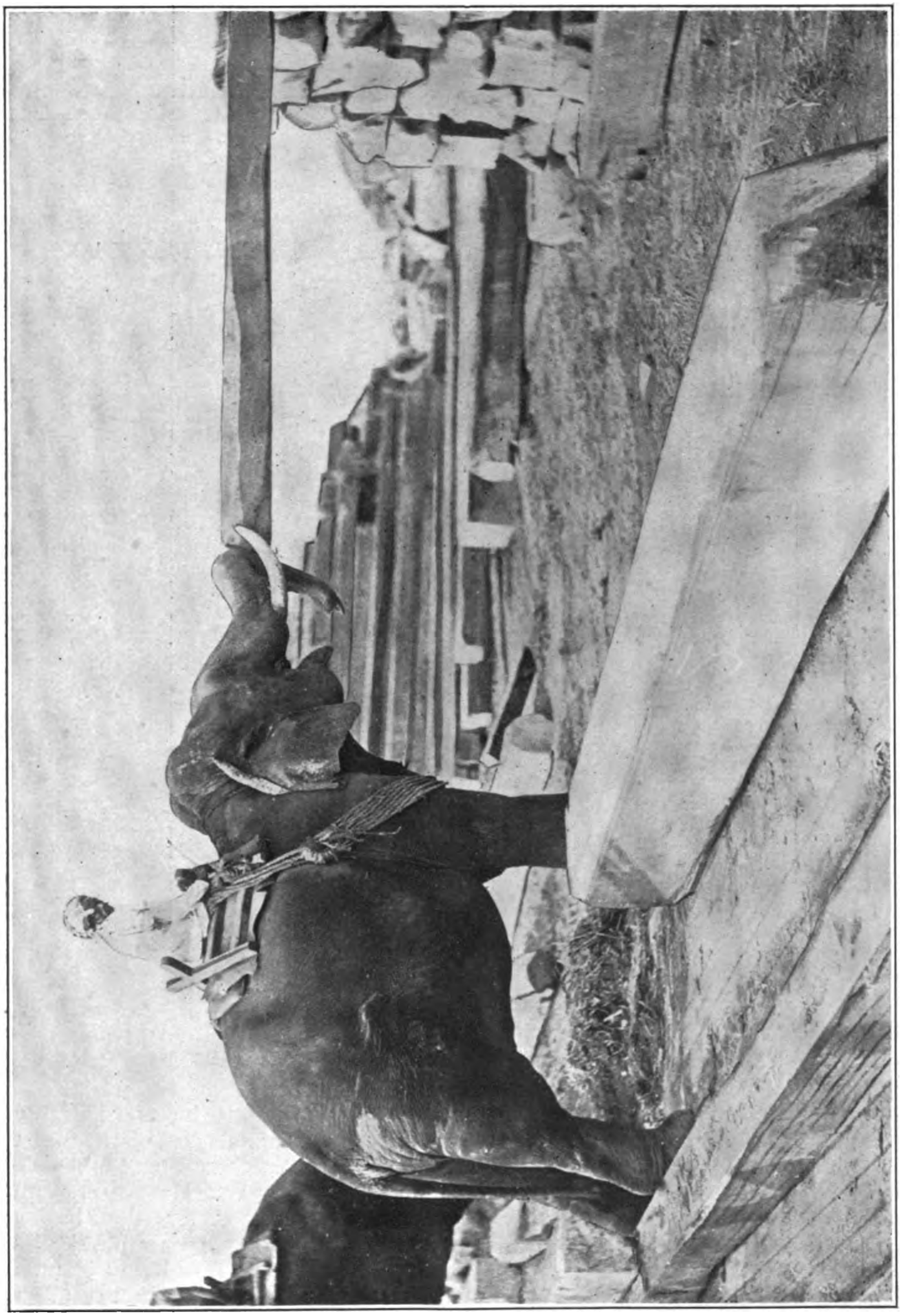
Elephants Used for Dragging Logs in the Forests of Burma

From Gifford Pinchot, Forester



From Gifford Pinchot, Forester

Piling Timber in the Lumber Yards of Burma



From Gifford Pinchot, Forester

Piling Timber in the Lumber Yards of Burma

From Gifford Pinchot, Forester

A Mixed Forest in Need of an Improvement Cutting

The crooked old chestnut in particular should be removed

service now has nearly 300 superior officers and over 10,000 rangers and forest guards. It has charge of about 200,000 square miles of forest, and produces a net revenue, after all expenses have been paid, of about $3,000,000 a year. In addition, the forests furnish to peasant holders of forest rights products whose value is estimated to be considerably greater than the whole cost of the forest service. About 30,000 square miles are effectively protected against fire, at an average yearly cost of less than half a cent per acre. These admirable results are especially interesting because India is like the United States in the great

From Gifford Pinchot, Forester

A Mixed Forest After an Improvement Cutting

extent and variety of her forests and in the number and fierceness of forest fires.

FORESTRY AT HOME

The forests of the United States cover an area of about 699,500,000 acres, or more than 35 per cent of the surface of the country. Before so large a part of them was destroyed they were perhaps the richest on the earth, and with proper care they are capable of being so again. Their power of reproduction is exceedingly good.

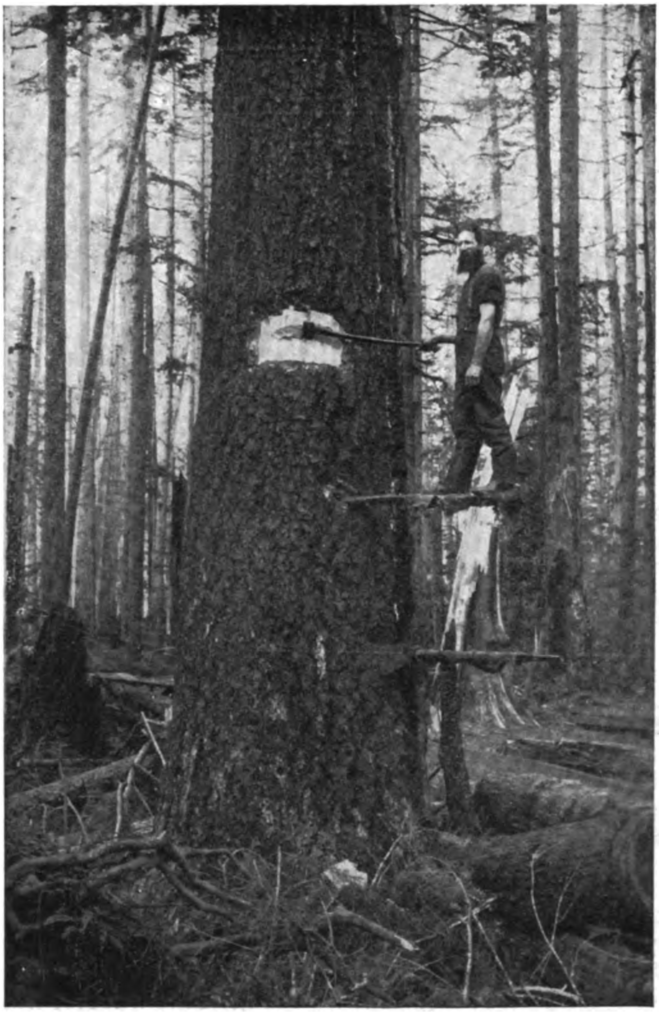
In the northeastern states and as far west as Minnesota once stretched the great white-pine forest from which, since settlement began, the greater part of our lumber has come. South of it,

From Gifford Pinchot, Forester

Conservative Lumbering in the Adirondack Mountains, New York

Note the height of the stump

in a broad belt along the Atlantic and the Gulf coasts, lies the southern pine forests, whose most important tree, both for lumber and naval stores, is the southern yellow pine. In the Mississippi Valley lies the interior hardwood forest of oaks, hickories, ashes, gums, and other hardwood trees. It is bordered on the west by the plains, which cover the eastern slope of the continental divide until they meet the evergreen Rocky Mountain forest, which clothes the slopes of this great range from the Canadian line to Mexico. Separated



From Gifford Pinchot, Forester

Wasteful Lumbering on the Pacific Slope

Note the height of the stump

from the Rocky Mountain forest by the interior deserts, the Pacific Coast forest covers the flanks of the Sierras, the Cascades, and the coast ranges. Its largest trees are the giant sequoia and the great coast redwood, and its most important timber is the fir.

The forests of the Philippine Islands cover an area of more than 40,000,000 acres. Their timbers, almost wholly different from those of the United States, are exceedingly valuable, both as cabinet woods and as construction timber. An efficient forest service was organized in 1898, and following its reorganization in 1902 a new and excellent forest law was passed in 1904. The Philippine forest service costs but half as much as the revenue received from the forests of the islands.

The island of Porto Rico contains a national forest reserve, the site of which was once covered with valuable hardwoods; but this forest has been much abused. Porto Rico, like the Philippines, has many kinds of wood valuable for cabinet-making.

THE SETTLER AND THE FOREST

When the early settlers from the Old World landed on the Atlantic coast of North America they brought with them traditions of respect for the forest created by generations of forest protection at home. The country to which they came was covered, for the most part, with dense forests. There was so little open land that ground had to be cleared for the plow. It is true that the forest gave the pioneers shelter and fuel and game for food, but it was often filled with hostile Indians; it hemmed them in on every side, and immense labor was required to win from it the soil in which to raise their necessary crops. Naturally, it seemed to them an enemy rather than a friend. Their respect for it dwindled and disappeared, and its place was taken by hate and fear.

The feeling of hostility to the forest which grew up among the early settlers continued and increased among their descendants long after all reason for it had disappeared. But even in the early days far-sighted men began to consider the safety of the forest. In 1653 the authorities of Charlestown, in Massachusetts, forbade the cutting of timber on the town lands without permission from the selectmen, and in 1689 the neighboring town of Malden fixed a penalty of 5 shillings for cutting trees less than 1 foot in diameter for fuel. An ordinance of William Penn, made in 1681, required that 1 acre of land be left covered with trees for every 5 acres cleared. But these measures were not well followed up, and the needless destruction of the forest went steadily on.

FIRST STEPS IN FORESTRY

More than a hundred years later, in 1795, a committee of the Society for the Promotion of Agriculture, Arts, and Manufactures in New York made a report on the best way to preserve and increase the growth of timber. Four years afterward Congress appropriated $200,000 for the purchase and preservation of timberlands to supply ship timbers for the Navy, and in 1822, with the same object in view, it authorized the President to employ the Army and Navy to protect and preserve the live-oak and red-cedar timber of the government in Florida. Since that time more and more attention has been given to the forests. In 1828 Governor De Witt Clinton, of New York, spoke of the reproduction of our woods as an object of primary importance, and in the same year the government began an attempt to cultivate live oak in the South for the use of the Navy. Three years later an act was passed which is still almost the only protection for the much-abused forests of the public domain.

In 1872 the Yellowstone National Park was established, and in 1873 Congress passed the timber-culture act, which gave government land in the treeless regions to whoever would plant one-fourth of his claim with trees. In 1875 the American Forestry Association was formed in Chicago through the efforts of Dr John A. Warder, who was one of the first men to agitate forest questions in the United States. In the centennial year (1876) Dr Franklin B. Hough, perhaps the foremost pioneer of forestry in America, was appointed special agent in the Department of Agriculture. This was the beginning of educational work in forestry at Washington. Soon afterward Congress began to make appropriations to protect the public timber, but nothing was done to introduce conservative forest management. The present Bureau of Forestry in the Department of Agriculture was established as a division in 1881.

About this time forest associations began to be established in the different states, the most influential and effective of which has been that in Pennsylvania. The states also began to form forest boards or commissions of their own.

In 1888 the first forest bill was introduced in Congress. It failed to pass, but in 1891 an act was passed which was the first step toward a true policy for the forests of the nation. The first step toward national forestry is control of the national forests. This act, whose chief purpose was to repeal the timber-culture act, contained a clause which authorized the President to reserve timberlands on the public domain, and so prevent them from passing out of the possession of the government.

THE PUBLIC DOMAIN

In all the states and territories west of the Mississippi except Texas, and in Ohio, Indiana, Illinois, Michigan, Wisconsin, Florida, Alabama, and Mississippi, all the land originally belonged to the government. This was the public domain. It has gradually been sold or given away until in many of the states it has all or nearly all passed to other owners. But it still includes more than 470,000,000 acres, or nearly one-third of the United States, not including the territory of Alaska, which has an area of about 350,000,000 acres. A large part of the public domain has been surveyed by the government and divided first into squares 6 miles on each side, called townships, then into squares of 1 mile, called sections, and these again into quarter sections and smaller divisions. The lines which mark these divisions are straight and at right angles to each other. When any part of the public domain is reserved or disposed of it is usually located by reference to these lines.

FEDERAL FOREST RESERVES

When the President was given the power to make forest reserves the public domain still contained much of the best timber in the West, but it was passing rapidly into private hands. Acting upon the wise principle that forests whose preservation is necessary for the general welfare should remain in government control, President Harrison created the first forest reserves. President Cleveland followed his example. But there was yet no systematic plan for the making or management of the reserves, which at that time were altogether without protection by the government. Toward the end of President Cleveland's second administration, therefore, the National Academy of Sciences was asked to appoint a commission to examine the national forest lands and report a plan for their control. The academy did so, and upon the recommendation of the National Forest Commission, so appointed, President Cleveland doubled the reserved area by setting aside 13 additional forest reserves on Washington's birthday, 1897.

EARLY OPPOSITION TO FOREST RESERVES DISAPPEARING

The Cleveland forest reserves awakened at once great opposition in Congress and throughout the West, and led to a general discussion of the forest policy. But after several years of controversy widespread approval took the place of opposition, and at present the value of the forest reserves is rarely disputed except by private interests impatient of restraint.

The recommendations of the National Forest Commission for the management of the forest reserves were not acted upon by Congress, but the law of June

4, 1897, gave the Secretary of the Interior authority to protect the reserves and make them useful. The passage of this law was the first step toward a national forest service. The second step was the act of Congress, approved February 1, 1905, which transferred the control of the national forest reserves from the Department of the Interior to the Department of Agriculture. This act consolidated the government's forest work, which had been divided between the General Land Office and the Bureau of Forestry, and secured for the reserves the supervision of trained foresters.

President McKinley, and after him President Roosevelt, continued to make forest reserves. The latter introduced a system of examining the proposed forest reserves, so that now their boundaries are better located than ever before. Under him great progress has been made by the government in bringing about the practice of forestry by forest owners and in awakening the great lumber interests, as well as the people in general, to the dangers of forest destruction.

USE OF FOREST RESERVES

The forest reserves lie chiefly in high mountain regions. They are 62 in number, and cover an area (January 1, 1905) of 63,308,319 acres. They are useful, first of all, to protect the drainage basins of streams used for irrigation, and especially the watersheds of the great irrigation works which the government is constructing under the reclamation law, which was passed in 1902. This is their most important use. Secondly, they supply grass and other forage for many thousands of grazing animals during the summer, when the lower ranges on the plains and deserts are barren and dry. Lastly, they furnish a permanent supply of wood for the use of settlers, miners, lumbermen, and other citizens. This is at present the least important use of the reserves, but it will be of greater consequence hereafter. The best way for the government to promote each of these three great uses is to protect the forest reserves from fire. The forest service plans to add a trained forester to the executive force of each forest reserve to introduce practical forestry on all reserves.

STATE FORESTRY

Many of the states have taken great and effective interest in forestry. Among those which have made most progress are New York and Pennsylvania. New York has a state forest preserve of 1,436,686 acres, and Pennsylvania one of 700,000. Michigan, Minnesota, and other states are following their example.

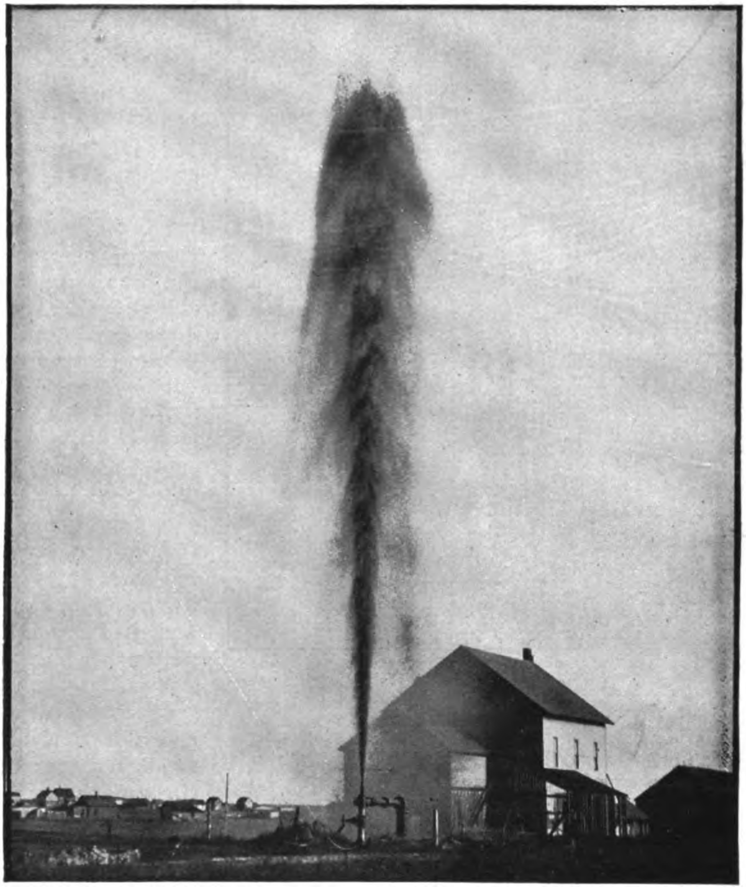
In 1892 the first example of systematic forestry in the United States was begun at Biltmore, in North Carolina. It is still in successful operation.

The first professional foresters in the United States were obliged to go abroad for their training, but in 1898 professional forest schools were established at Cornell University, in New York, and at Biltmore, in North Carolina, and they were followed by the Yale Forest School in 1900. Others have sprung up since. At present thorough and efficient training in professional forestry can be had in the United States.

THE CENTRAL GREAT PLAINS

THE United States Geological Survey has for a number of years been studying the underground waters which are flowing hundreds of feet beneath the surface in many sections of the Central Great Plains, including the greater portions of South Dakota, Nebraska, and Kansas and the eastern portion of Colorado and of Wyoming, an area of about one-half million square miles. In order that we may make the best possible use of the underground "rivers" which it it is believed flow perhaps continuously for some hundreds of miles, it is necessary to understand the structure and stratigraphy of the water-bearing formations.

The question of water supply, both overground and underground, is one of great interest to the people in this district, and although considerable progress

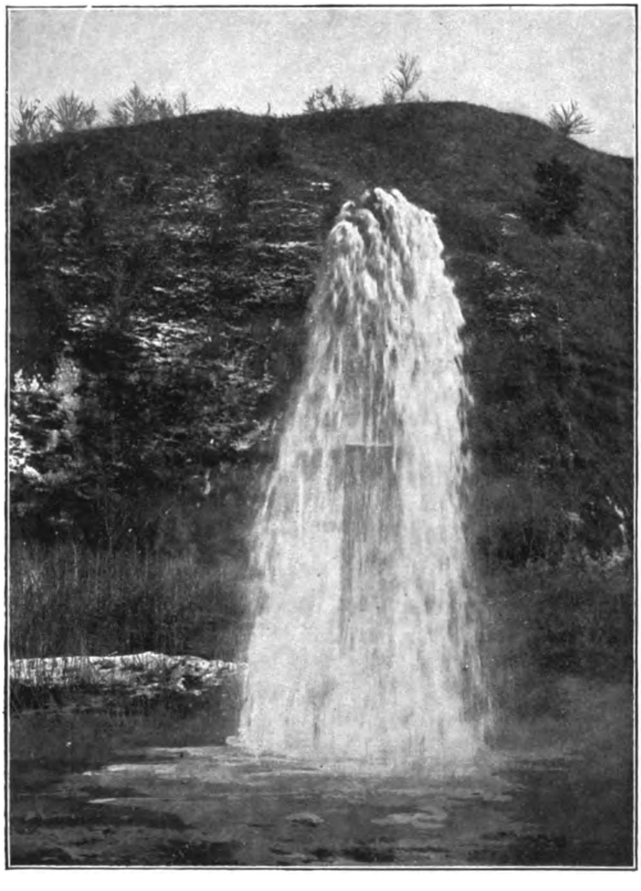


From N. H. Darton, U. S. Geological Survey

Artesian Well at Woonsocket, South Dakota

This well throws a 3-inch stream to a height of 97 feet has been made in some sections in developing well waters, there are vast areas in which the present supplies are inadequate, even for local domestic use.

The investigation has been in charge of Mr N. H. Darton, who has recently brought together the results of the work in a handsome quarto volume of 400 pages published by the Survey, and entitled "Geology and Underground Water Resources of the Central Great Plains." Mr Darton gives an excellent geologic history of the region, describing not only those sections which conceal water far down in the earth, but also those places which are dry below as well as above.



From N. H. Darton, U. S. Geological Survey

Artesian Well at Lynch, Nebraska

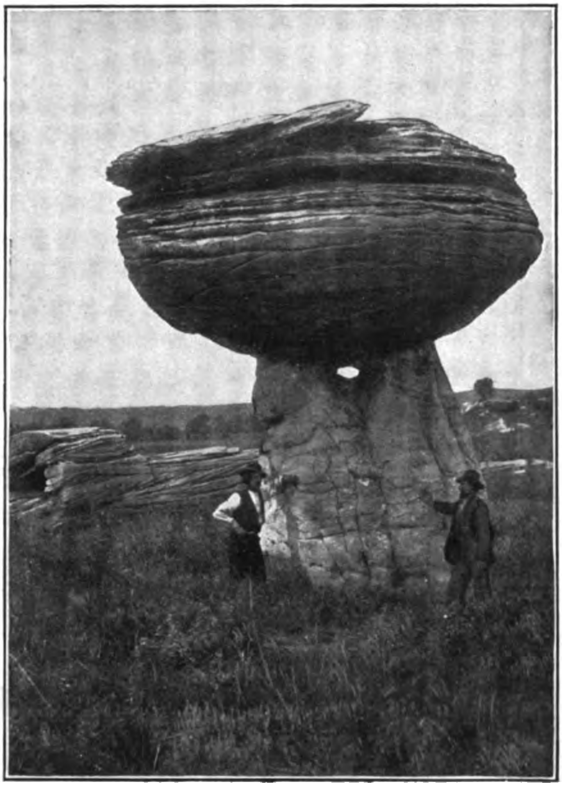
This well has a flow of 3,100 gallons a minute from an 8-inch casing, with a pressure of 85 pounds to the square inch. A first flow was found at 740 feet and a second at 875 feet

Smooth surfaces and eastward-sloping rolling plains are the characteristic features of the region, but in portions of the province there are buttes, extended escarpments, and local areas of badlands.

The report reproduces more than one hundred beautiful photographs by Mr Darton of different scenes in the Great Plains. Several of these are given here. The thick succession of sedimentary formations underlying the Great Plains includes porous strata containing large volumes of water. These water-bearing deposits comprise widespread sheets of sandstones or sand, from Cambrian to Tertiary in age. The sandstones of the older formations are in sheets often several hundred feet thick, alternating with bodies of relatively impermeable shales or limestones, so that they present favorable conditions as water-bearers. To the west they are upturned by the great uplifts and outcrop along the high mountain slopes; to the east most of them rise gradually to the surface, while in the central and northern regions they lie at great depth under the heavy mantle of younger deposits.

Part of the surface water passes into the sandstones in their elevated outcrop zones along the foot of the western mountains and flows east through the permeable rocks, in most cases finally escaping in springs in the low-level areas of outcrop eastward and southward. In such water-bearing strata as the Dakota and underlying beds, which are overlain by a thick mass of impermeable deposits, the waters are under great pressure, for the intake zone has an altitude of from 4,000 to 6,000 feet and the region of outflow is only from 1,000 to 1,200 feet above sea-level. The existence of this pressure, as found in many wells in eastern South Dakota, is the strongest evidence we possess that the waters flow underground for many hundreds of miles. Several wells show surface pressures over 175 pounds to the square inch and two are slightly over 200 pounds, the latter indicating a pressure of 780 pounds at the bottom of the well. In South Dakota the Dakota sandstone carries a large volume of water, which has been extensively utilized by artesian wells. This water is under pressure so great that in the eastern portion of the state flows are obtainable in all but the very highest lands, except in the southeast corner, near the zone, where the head is lost by the sandstone reaching the surface. Over a thousand deep wells have been sunk east of the Missouri River, most of which are from 500 to 1,000 feet in depth and generally yield a large supply of flowing water, much of which is used for irrigation. The aggregate flow from these wells is estimated to be about 7,000,000 gallons a day.

The illustration on page 389 shows a remarkable well. Another phenomenal well in the same state is a well at Springfield, which has a flow of 3,292 gallons per minute, although its closed pressure is not so great as that of many other wells in the state. It furnishes power for a 60-barrel flour mill by day and for an electric-light plant by night. For a while it threw sand, and when this finally ceased the flow was thought to have slightly decreased.

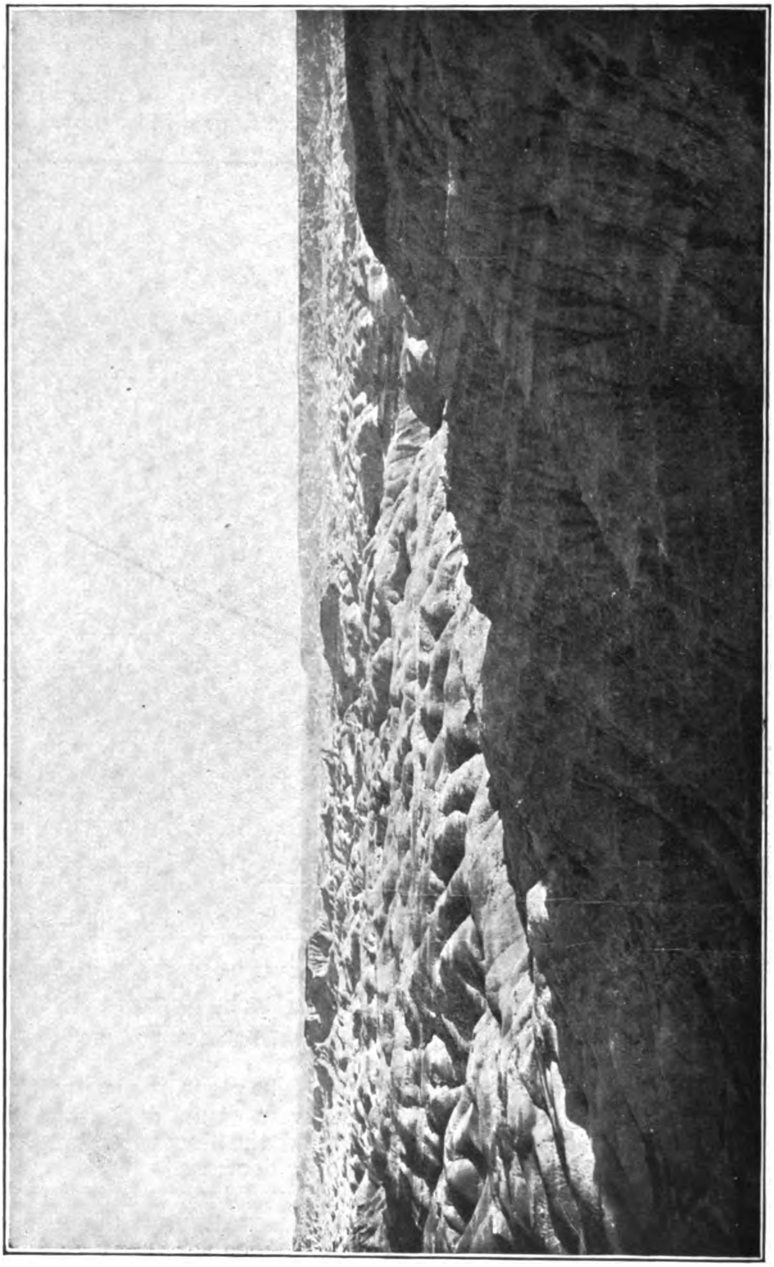


From N. H. Darton, U. S. Geological Survey

Pulpit Rock, Kansas

An outcrop of Dakota sandstone

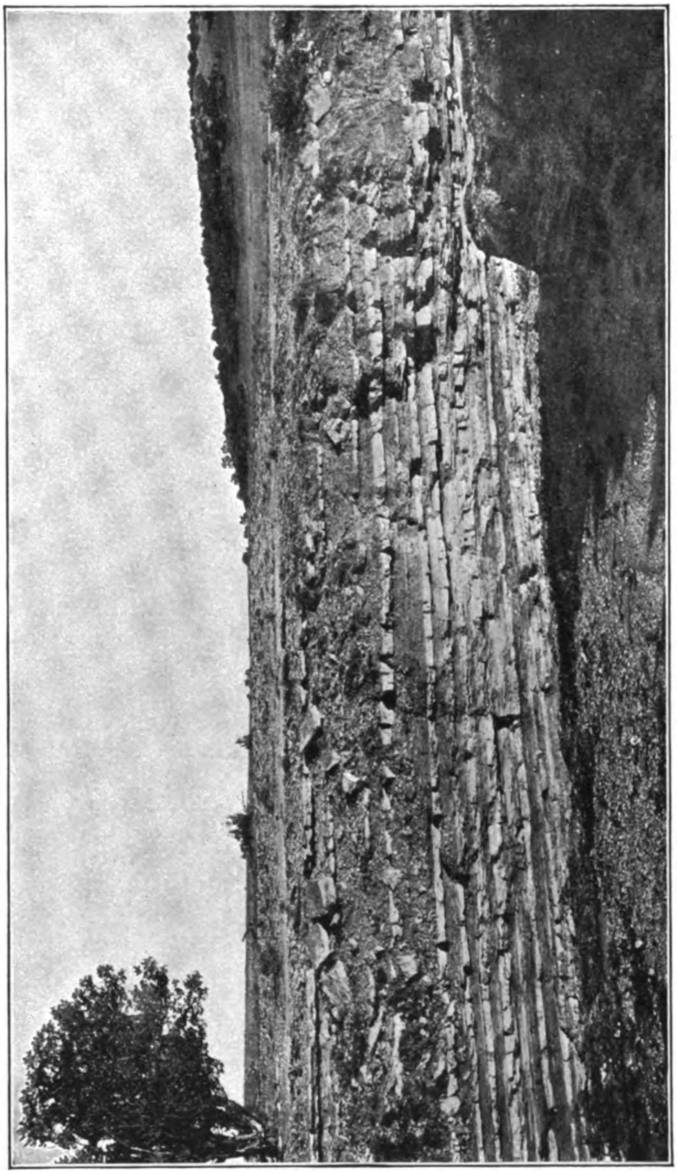
It is believed by some persons that owing to this great draft upon the resources the available supply is diminishing, but there is as yet no valid evi-



From N. H. Darton, U. S. Geological Survey

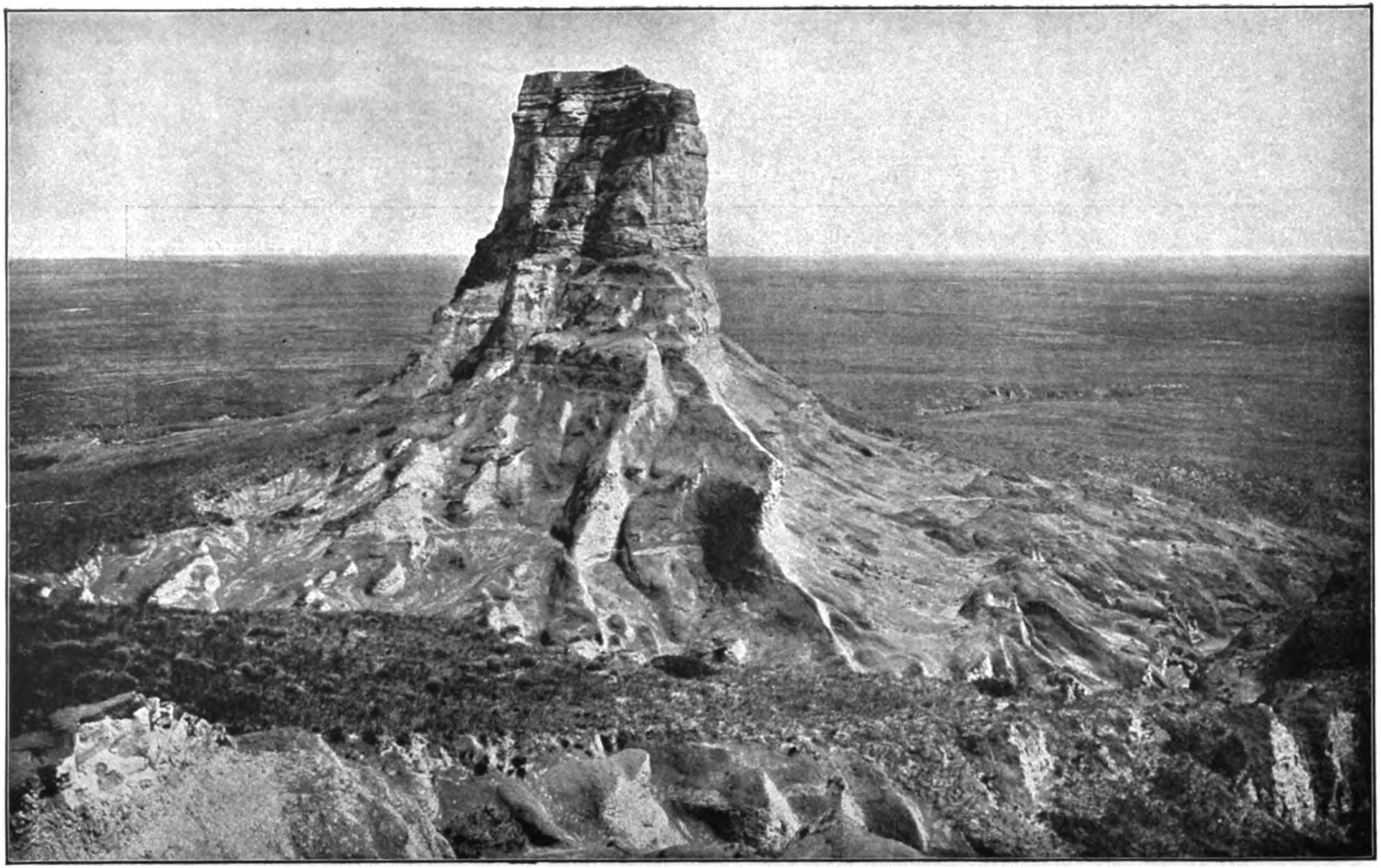
Big Badlands, South Dakota, East of Flour Trail

Characteristic rounded forms of Chadron clays, overlain by Brule clay (Oredon beds) in distance; remnants of plateau out of which badlands were carved in foreground and in outlying buttes. Looking east



Greenhorn Limestone in Benton Group Near Thatcher, Colorado

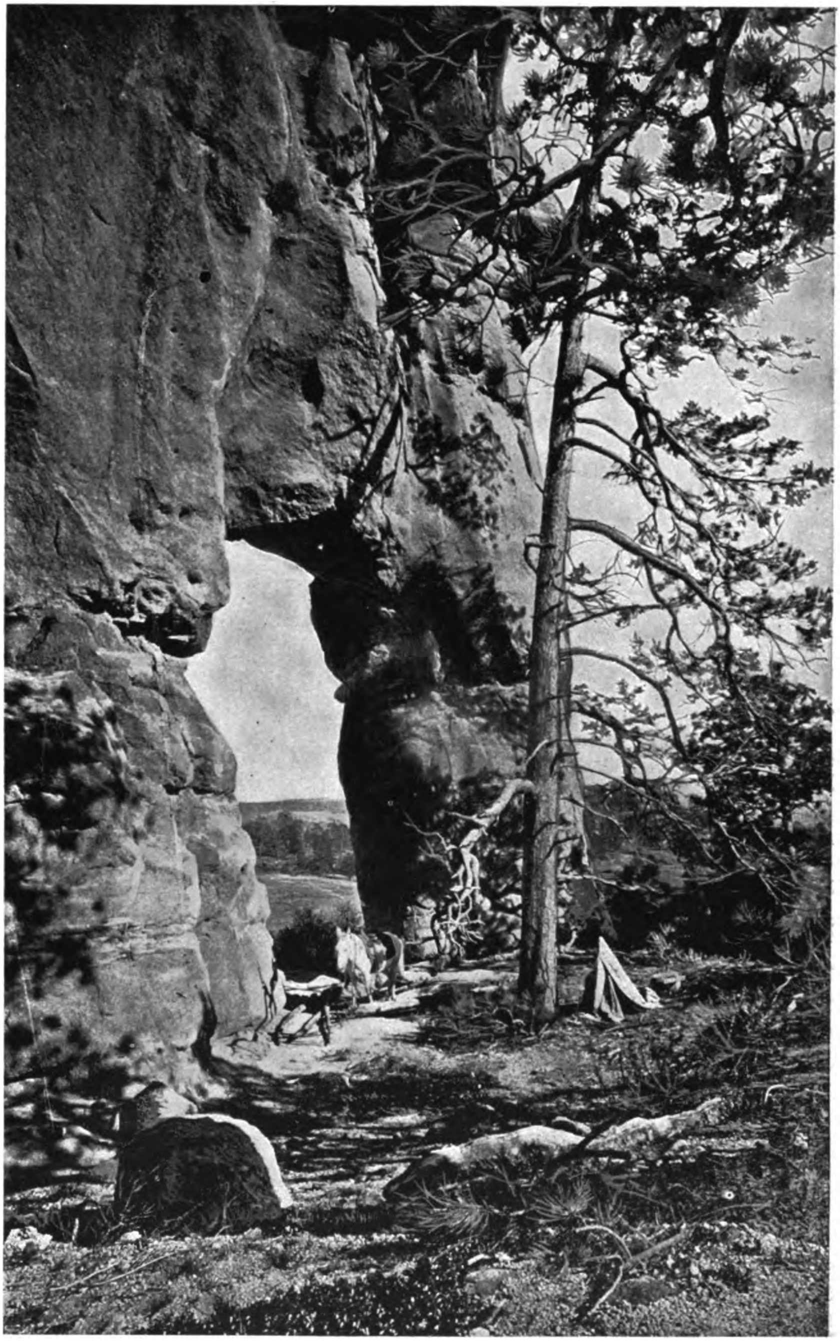
View showing alternation of limestone and shale. Photograph by G. K. Gilbert



From N. H. Darton, U. S. Geological Survey

Jail Rock

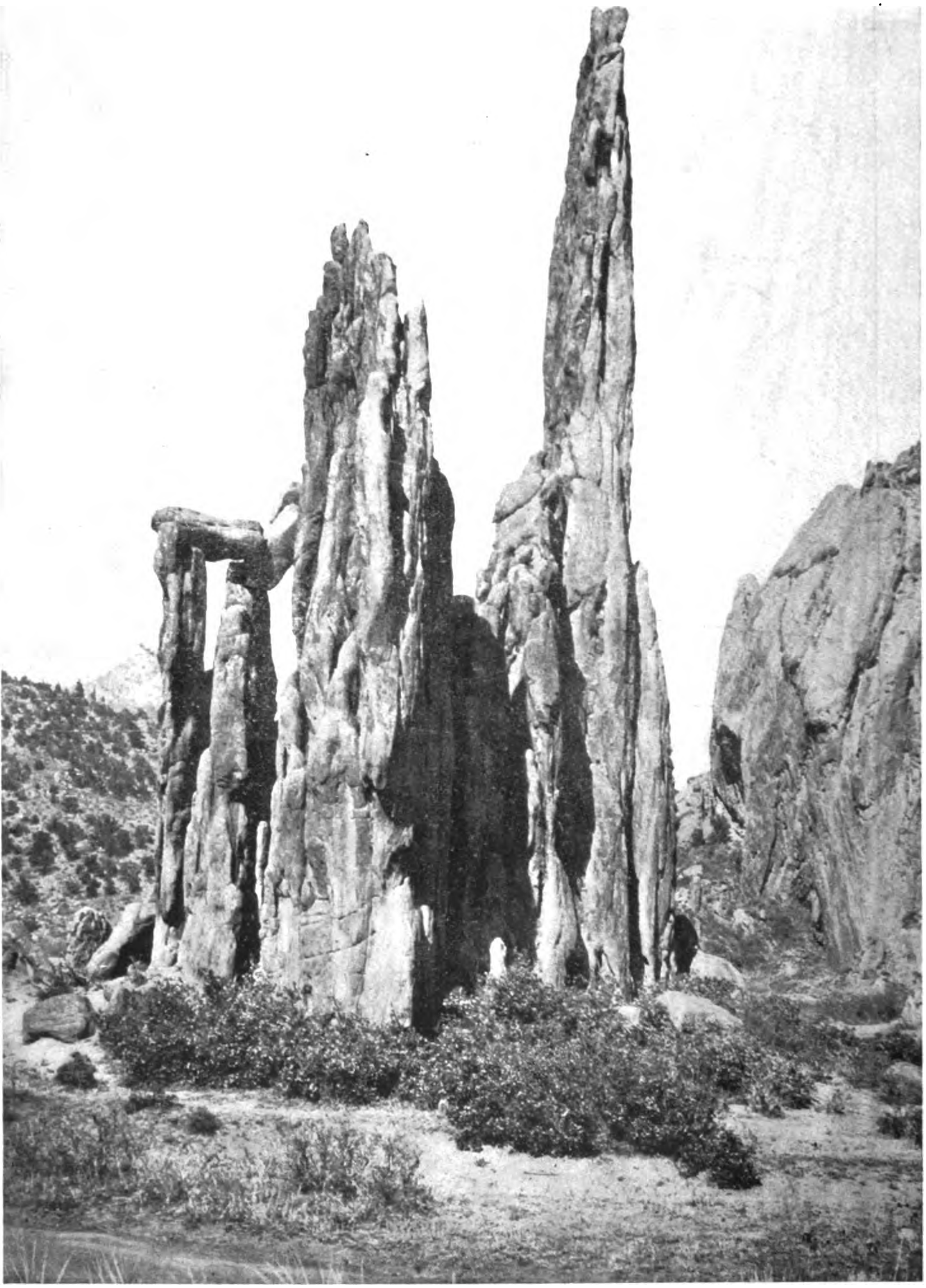
Showing castellated form of weathering of Gering sandstone; slopes of Brule clay. Valley of North Platte in distance
View from Court-house Rock. Looking east



From N. H. Darton, U. S. Geological Survey

Archway Eroded in Monument Creek Sandstone, at "Elephant Rock," Near Monument, Colorado

Showing massive character of sandstone



From N. H. Darton, U. S. Geological Survey

Cathedral Spires, Garden of the Gods, Colorado

Vertical strata of lower Wyoming red grits. Looking north dence that this is the case, excepting locally where there are numerous wells. Individual wells often diminish in efficiency owing to leakage, clogging, and other causes, but ordinarily new wells in the same vicinity show the same pressure and flow as were found in the older ones ; but it is probable that if this large flow is permitted to continue the available volume of artesian supply will eventally be greatly diminished.

The source of water is believed to be in the Black Hills and in the Rocky Mountains, for the sandstone appears to be a continuous stratum or a series of strata, permeable throughout, and containing water which to the east has much of the initial head or pressure due to the high altitude of the zone of intake on the mountain slopes. There are extensive areas in central South Dakota in which the underground waters have not yet been developed. Apparently in these areas the Dakota sandstone lies deep, but not at an impracticable depth for well-boring. Probably further drilling will show that flowing waters may be obtained all the way up Cheyenne Valley and its two branches to the Black Hills, and up the valleys of White, Bad, and Owl rivers nearly to longitude 102°.

The Central Great Plains region presents considerable variety of climate. To the east, on the plains, the precipitation varies from moderately humid to nearly arid, the change taking place gradually from east to west. To the east there are 40 inches of rainfall per year, while to the west, in the region adjoining the Rocky Mountains and the other ranges, there are less than 12 inches over an area of considerable extent. To the east the precipitation is ample for crops, and that portion of the region is one of the greatest producers of corn, wheat, and other agricultural products in the world, while to the west there are broad tracts in which no crops can be produced without irrigation. On the mountains in the western portion of the area there is locally increased precipitation, which in many areas is sufficient for agriculture. The amount of water that falls in the arid area is enormous when the number of cubic feet per square mile is calculated, but much of it comes in very heavy showers, after long intervals of drought, often with severe hot winds. If a portion of the rainfall could be stored, much of it could be used for irrigation.

DEFORESTATION AND CLIMATE

WHETHER forests exercise a perceptible influence upon the climate is a very old question, and even today it is not definitely settled. At a recent session of the German Meteorological Society at Berlin a lecture on "Deforestation and Climate" was delivered by Doctor Hennig, from which the following extracts are taken :

In many countries a drying up of the climate has occurred, which is shown perhaps most strikingly in almost the whole of Africa. That deforesting has assumed constantly growing proportions in almost every part of the world is still more apparent. The climate of Greece, where today only 16 per cent of the area is covered with forests, has deteriorated. An increase of temperature and decrease of rain are noted, compared with ancient times, especially in Attica, which was thickly covered with forests about 3,000 years ago, and where hardly any rain now falls, while the heat in the open air attains a degree which would make the "Olympian games" almost an impossibility. A similar condition exists in the Peninsula of Sinai, where thousands of years ago the people of Israel lived in a luxuriant and fertile country and where today only forestless deserts abound. Palmyra, also once a flourishing oasis in the Syrian desert, presents today only a desolate waste of stones and ruins. In Mexico, where the Spaniards cut down the forests in the mountains, droughts changing to devastating floods are now noticeable, especially in the vicinity of the City of Mexico. In upper Egypt, where only 100 years ago rain was abundant, drought now usually prevails. In Algeria, where, since the middle of the last century, the forests have been cut down on a large scale, dry weather has increased, and in Venezuela the level of Lake Tacarigua, to which Alexander von Humboldt drew attention, has been lowered in consequence of deforestation.

If these and other facts are kept in mind, the sentence "Man traverses the earth and a desert results" is understood. It must not be forgotten, however, that this applies mainly to the influence of civilization upon appearances and is not always due to climatic changes produced by deforesting. Some authorities even deny the influence of forests on the weather and climate. It cannot be denied, however, that dense forests favor moisture and prevent the drying out of the soil to a considerable degree. At any rate, deforesting, which in modern times assumes constantly growing proportions for industrial and agricultural purposes, is of universal importance.

Germany, with a forest area of about 26 per cent, realizes annually nearly $60,000,000 worth of timber therefrom, while the wood importations are about of the same value. The consumption of wood increases from year to year, and systematic forestry has not succeeded in keeping up the forest area of Germany. If it is furthermore borne in mind that Canada, which formerly possessed more than 300,000,000 acres of forests, has today only a forest area of about 225,000,000 acres, it becomes evident that the question of deforestation assumes great importance. If civilization continues to change the face of the earth, the problem of its wood supply will present itself like that of coal and force the finding of a suitable substitute.

THE PROSPERITY OF MEXICO

"COMMERCIAL Mexico in 1905" is the title of a monograph just issued by the Departmeut of Commerce and Labor through its Bureau of Statistics.

Commerce between Mexico and the United States has grown in recent years with great rapidity, and large sums of American capital have been invested in various business enterprises in Mexico, including agriculture, mining, transportation, and manufactures, while on the other hand Mexico is contributing each year more largely to the commercial requirements of the United States, especially in those articles and classes of articles not produced in this country, or at least not produced in sufficient quantities to supply the demands of manufacturers or others in whose industries or business enterprises they are required. Imports of merchandise into the United States from Mexico have grown from $4,346,364 in 1874 to $43,633,275 in 1904, the value of merchandise imported from Mexico in 1904 being, therefore, ten times as great as in 1874. On the other hand, exports from the United States to Mexico have grown from $5,946,839 in 1874 to $45,844,720 in 1904, the exports to Mexico in 1904 being thus about eight times as great as in 1874. Sixty-four per cent of the exports of merchandise from that country were sent to the United States, while 53 per cent of the imports of merchandise were from the United States. In the last 20 years its revenue has increased from $10,000,000 to $30,000,000, its imports from $20,000,000 to $75,000,000, and its exports from $7,000,000 to $43,000,000, exclusive of 40½ millions of gold and silver. The investment of American capital in Mexico was estimated by United States Consul-General Barlow in 1902 at $500,000,000, nearly all invested within the last twenty-five years, and about one-half of it within the last five years.

W[illegible] e [illegible]hed a new edition of our map of Alaska, which was prepared by the United States Geological Survey. The map is 36 by 42 inches, in 3 colors, and is the first contour map of Alaska that has been made. : : : : By mail, 25 cents.

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COMMERCIAL PRIZE OF THE ORIENT*

BY HON. O. P. AUSTIN,

CHIEF OF THE BUREAU OF STATISTICS AND SECRETARY OF THE NATIONAL GEOGRAPHIC SOCIETY

MY general purpose in this discussion of the commerce of the Orient is to call attention to the extraordinary physical difficulties which have attended efforts of the Occident to cultivate commerce between these two great sections of the world and the difficulties which still exist in the Orient itself, but which are likely to be overcome in the near future. Transportation is to commerce what the breath of life is to the body. Without transportation there can be no commerce. The obstacles to land transportation, which nature had interposed between the Occident and the Orient, in the form of mountain and desert, rendered that commerce extremely small until the application of the compass to ocean navigation enabled man to find an all-water route from the Occident to the Orient.

This was again improved when man learned to apply steam power to transportation upon the ocean, and again when he shortened the route between Europe and Asia by the construction of the Suez Canal; but steamships upon the ocean are of little value without facilities for transporting the products of the interior to the water's edge. These facilities are now supplied in certain parts of the world, especially Europe and the United States, by railways, but they have only recently begun to make their appearance in the Orient. As a consequence, the development of commercial possibilities and commercial power in that section has been delayed, and it is my purpose, in this discussion, to show the progress now being made in developing in the Orient these transportation facilities which have already made commerce great and successful in other parts of the world, and which promise to make it equally important in that great section of the world whose industrious people number more than half the population of the globe.

THE STRUGGLE FOR THE COMMERCE OF THE ORIENT BEGAN THOUSANDS OF YEARS AGO

The commercial prize of the Orient has commanded the attention of the Occident for more than 4,000 years.

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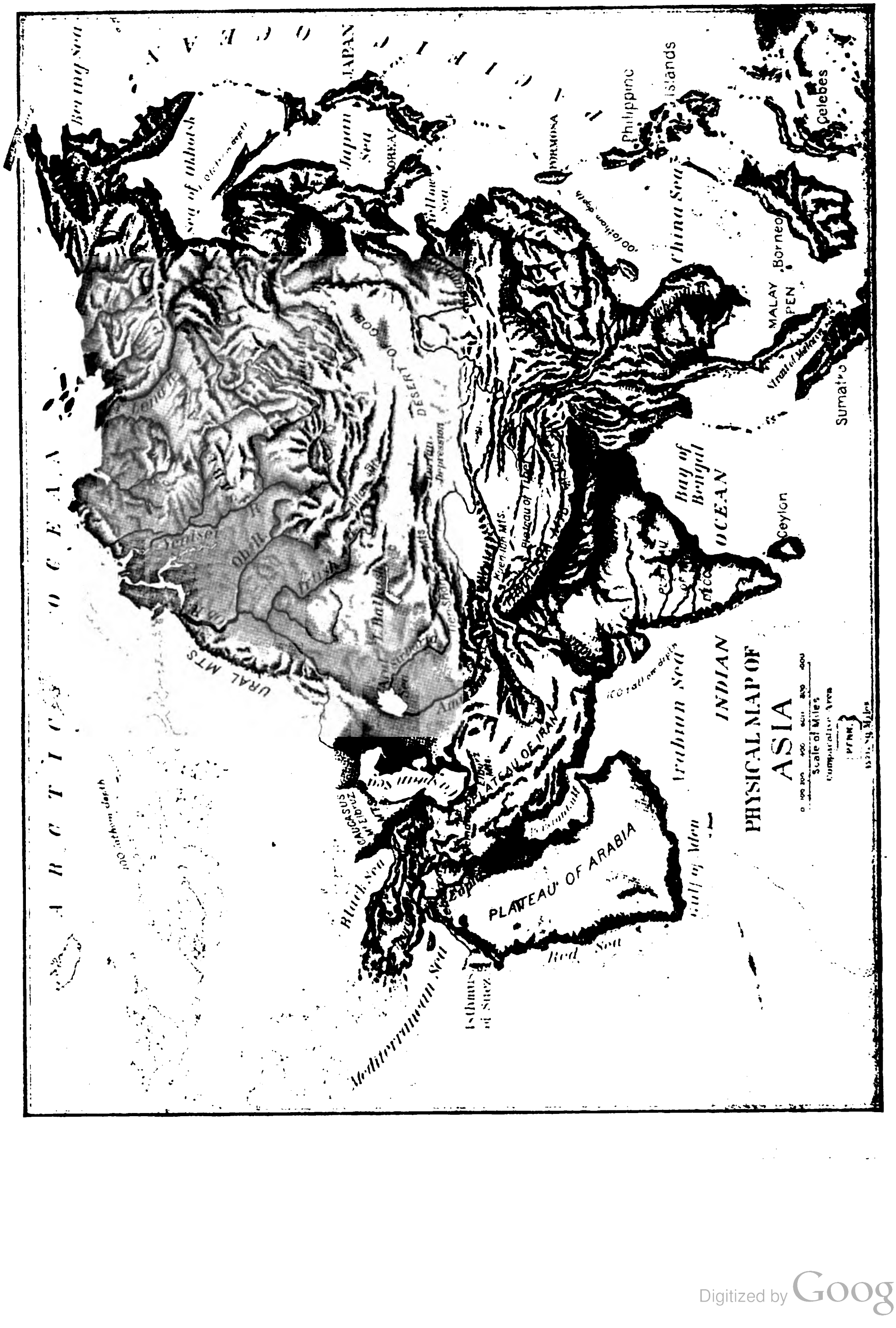
*An address to the National Geographic Society, March 30, 1905


PHYSICAL MAP OF
ASIA
Scale of Miles
ARCTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
URAL MTS
Bering Sea
Sea of Okhotsk
JAPAN
Japan Sea
KOREA
Yellow Sea
FORMOSA
Philippine Islands
China Sea
Borneo
Celebes
MALAY PEN
Strait of Malacca
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Red Sea
PLATEAU OF ARABIA
PLATEAU OF IRAN
CAUCASUS
Black Sea
Mediterranean Sea
Isthmus of Suez
Lena
Yenisei
Obi
DESERT OF GOBI
Plateau of Tibet
HIMALAYA MTS.
Amu
100 fathom depth

Map Illustrating the Obstacles to Land Transportation which Rendered Early Commerce Between Occident and Orient Extremely Difficult

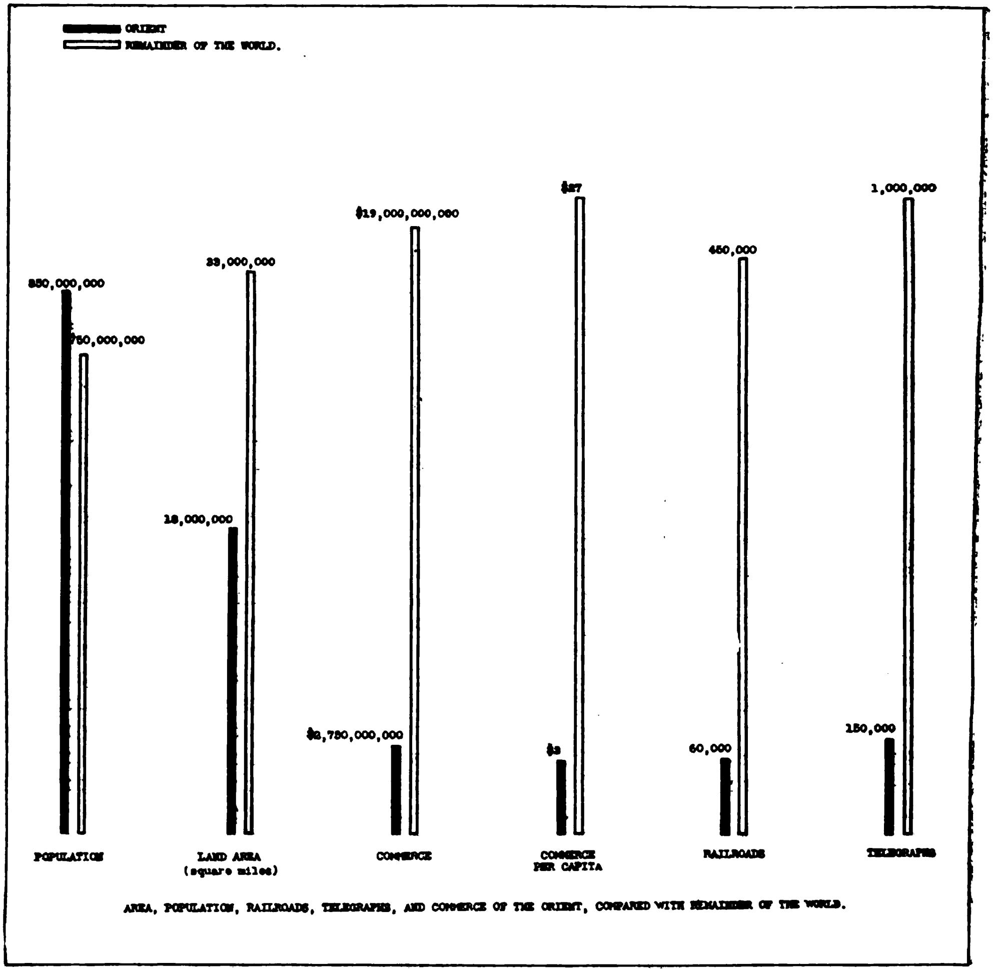
From the earliest dawn of history down to the present hour the over-expanding West has struggled for the control of the commerce of the East. Whether that struggle was against the fierce blasts of the desert, the attacks of the half-civilized tribes through whose territory it must be carried, or the death-dealing cannon, whose thunders are heard around the world today, it has been vigorous, unyielding, continuous; and as civilization has advanced, commerce developed, transportation cheapened, and the wants of man expanded, the importance of this commercial prize has increased until its value has today reached the enormous sum of nearly 3,000 millions of dollars per annum.

In all that time commerce has been the faithful handmaiden of geography. It has explored unknown lands, has learned the value of their products, has formed the acquaintance of the people, has made the ocean its highways and the desert and the mountains its byways, and has been the chief contributor to geographic knowledge of the Orient and the Occident, the temperate zones and the tropics, and even the frozen fastnesses of the Arctics. Whether the search for a route to the Orient was across the deserts of Asia, around the stormy capes at the Far South, or battling with the ice at the North, geography has been the gainer, and the commercial struggles and sacrifices of each generation have contributed to the geographic knowledge of that which followed it.

The earliest record of transactions between men and groups of men shows commerce passing between the Nile Valley, then the Occident of the civilized world, and the Orient, the Euphrates Valley, India, and China. As early as 2,500 years before the Christian era caravans of camels laden with merchandise were passing back and forth across the sandy deserts of Arabia between the Nile Valley at the west and the great commercial cities of Nineveh and Babylon at the east, and these cities in turn had like relations with India and perhaps China. Whether the commerce with China at that early day was by the way of a direct land route from the Euphrates Valley is not clear, but there is at least reason to believe that there were trade routes between India and China, and that the silks and other merchandise of China at the extreme east found their way through India and the cities of the Euphrates to the Nile Valley at the west.

This commerce was, of course, small in quantity as compared with that of today, and consisted only of the easily transported articles. But it was commerce, nevertheless, and one for which men risked their lives, and which then as now contributed to the geographic as well as the commercial knowledge of the world. How the commerce of that period, carried on first by the Arabs across the desert with camel caravans and later by the Phœnicians with their coasting vessels and thence by caravan, compares with that of today, when railroads traverse the land and great steamships plow the ocean, may be worth a moment in passing. The land commerce of that period was carried by camels, of which it would require 5,000 to carry as much as one modern train of cars, while the water-borne commerce was in oar-propelled vessels, of which it would require 300 to carry as much as a single modern steamer of today.

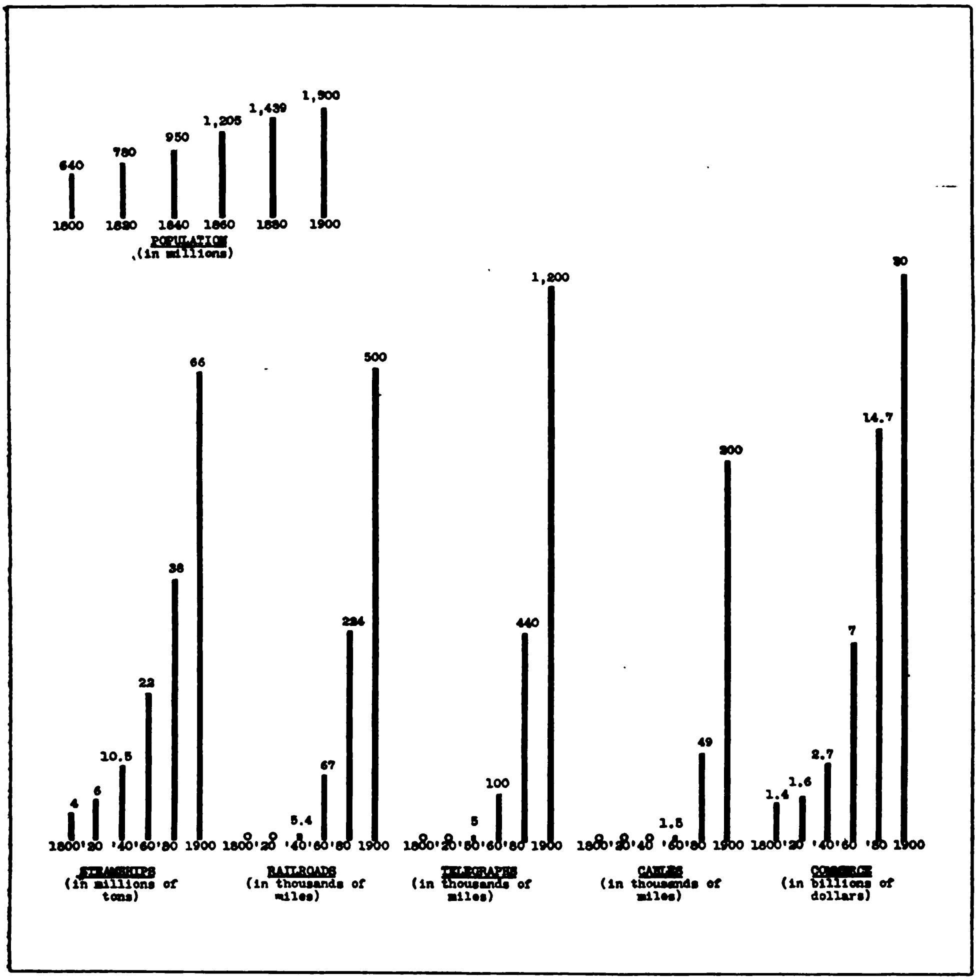
Even a thousand years later the caravans, which made their way from the shores of the Mediterranean to China, occupied more than one year in the round trip, while the vessels, which had then begun to utilize sails in conjunction with oars, still hugged the coast and traveled only by day, and in their long voyages were sometimes compelled to halt for months at a time while the occupants replenished their supplies of food by sowing, cultivating, and reap-



The Growth of the World During the Nineteenth Century

ing a crop on some favorable shore, after which they passed on and completed their round of commercial transactions. But even these adverse conditions did not deter the Occident from continuing its trade with the Orient, and as the Occident expanded still farther to the west trade grew and the area of commerce expanded until the tin of the British Isles, the amber of the Baltic, the silver of Spain, and the purple cloths, the glass, and other manufactures of Tyre and Sidon became a part of the commerce which the Phœnicians and Carthagenians carried to the Orient.

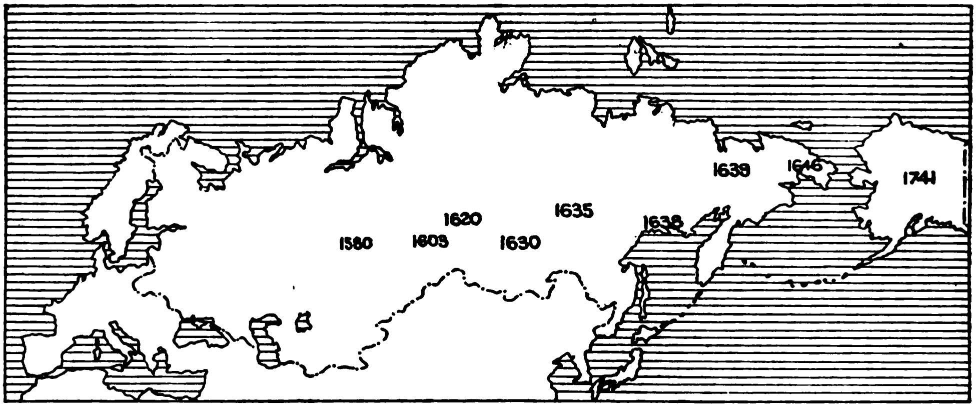
The establishment of governments over the great area east of the Mediterranean encouraged the development of commerce. The Persian Empire, with its satrap system of government, its post-roads, and the metallic currency



A Comparison of the Orient and the Remainder of the World in Area, Population, Railroads, Telegraphs, and Commerce. See page 412

which it introduced, aided commerce and extended geographic knowledge.

With the conquests of Alexander, by which his empire was extended to India, came a more intimate knowledge of the Orient and its wonderful commercial possibilities, and the ivory, the fine woods, the spices, the jewelry and precious stones of that section, and the silks and other products of China which then reached the markets of India were freely exchanged for the cloths and furs and tin and silver and amber of the Occident. Yet the slow rate of travel, and therefore of commercial and geographic research, even at that time, is shown by the fact that the return of that portion of Alexander's forces which traveled by sea from the mouth of the Indus to the head of the Persian Gulf and thence to

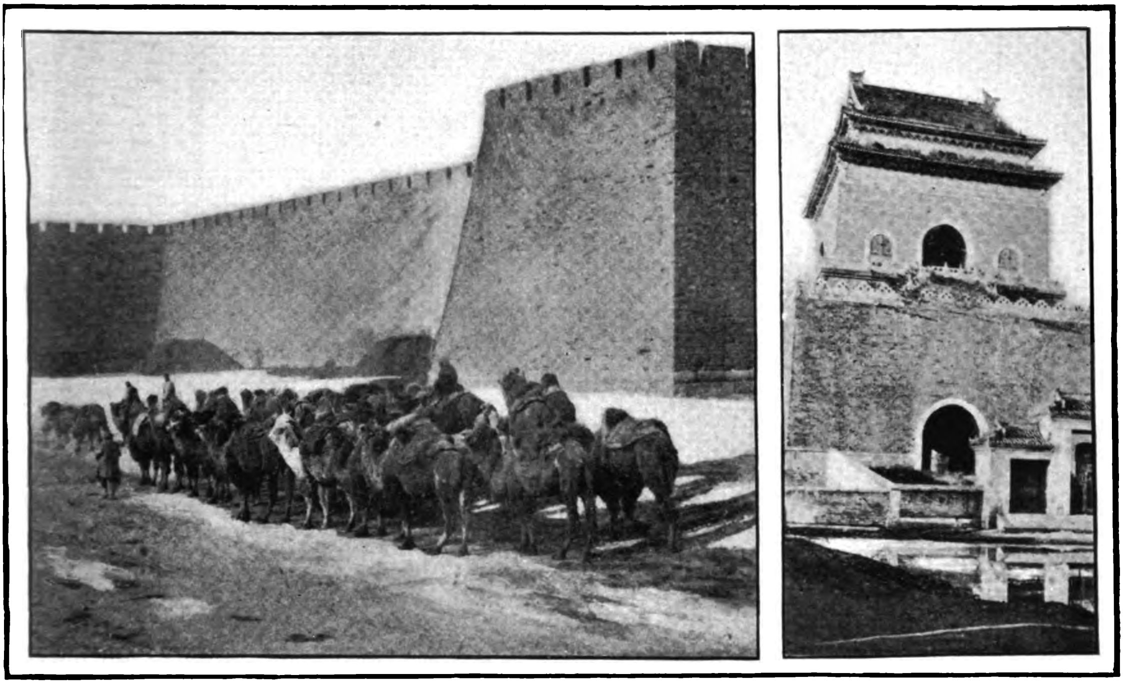


The Successive Advances of Russia to the Pacific. See page 410

Susa occupied nearly a half year of time.

The next great extension of the commerce of the West with the East was that developed by the Romans. While they were not a commercial people in the generally accepted sense of the word, the fact that they were compelled to supply the wants of the luxurious element of a city having more than one million people led them to cultivate a much greater trade with the Orient than had been ever before known. Their area at the west and north extended to the Atlantic and the British Isles, and at the south included the coasts of Africa, and on the east touched the Red Sea and the Persian Gulf, through which they had ready access to India. Their vessels were a considerable advance upon those of the Phœnicians, though still propelled in part by oars, and a large trade was carried on with India, extending to Ceylon, where exchanges of merchandise were made with coasting vessels from China. This trade was chiefly in the luxuries which India could supply to the wealthy Romans, and it is stated that the silk brought from China was considered worth its weight in gold, and that as much as $240,000 was paid for a single pearl from India. The chief articles drawn from the Orient by the Romans were cotton goods, silks, ivory, carvings, spices, incense, perfumes, ointments, jewelry, pearls, sapphires, and diamonds, and the articles sent in exchange included woolen and linen cloths, glass, tin, wines, and gold and silver.

Even the darkness of the middle ages did not terminate the commercial relations of the Occident with the Orient. The great commercial city of Venice, which sprang into existence with the decadence of the Roman Empire, developed a trade with the Far East which surpassed that of any of its predecessors. Its ships sailed at regular intervals for Alexandria and the eastern ports of the Mediterranean and Black Seas, accompanied by fleets of war vessels for their protection. The merchandise passing to and from the Orient was in part sent overland from the Mediterranean to the Red Sea or the Persian Gulf, and thence eastward by water and in part by the land routes east of the Mediterranean and Black Seas. A consular system established by the Venetian government helped in developing trade abroad and in the distribution of geographic information, and commerce extended not only eastward, but also to the north and



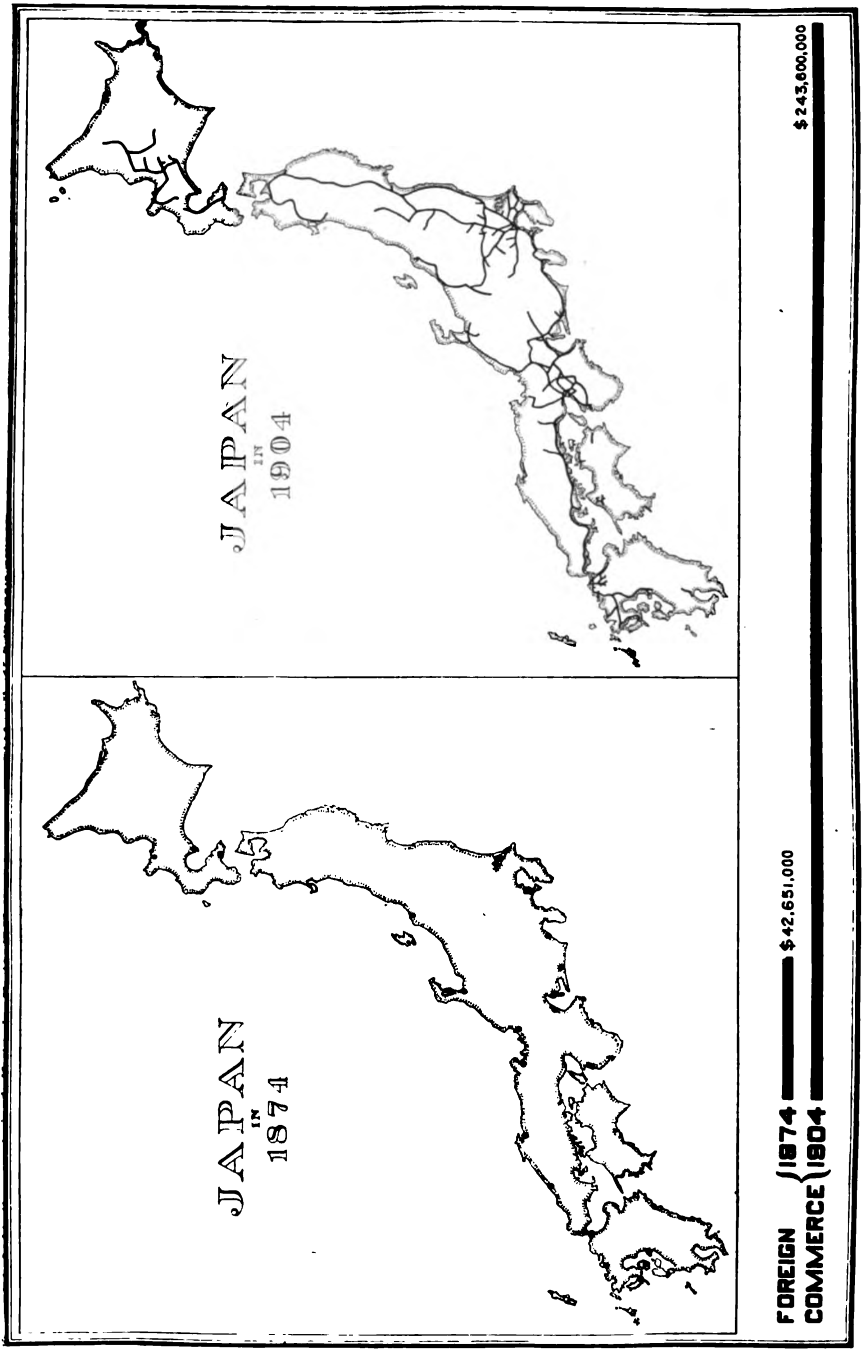
From "China's Open Door," by Rounsevelle Wildman. Copyright, 1901, Lothrop Publishing Company

Transportation in China. Camel Train Outside the Pekin Wall Military Gate

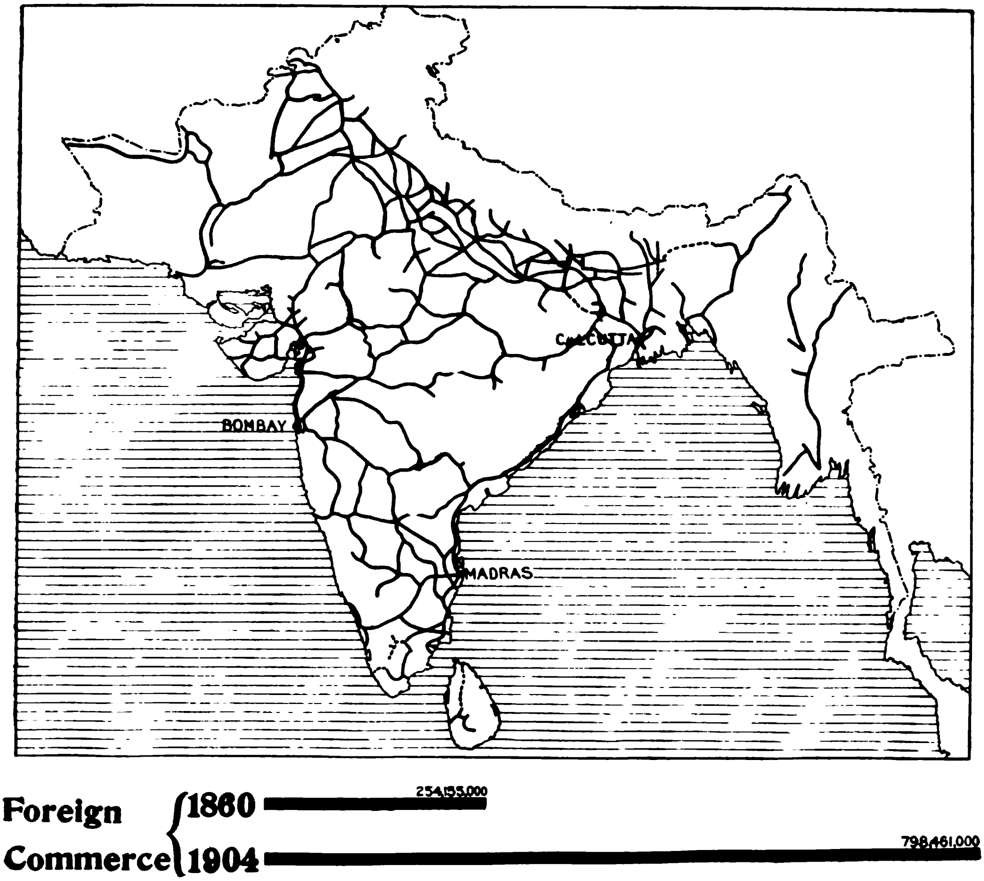
A modern train of cars carries as much as 5,000 camels

west, part of the trade for northern Europe going by the way of the Mediterranean and Atlantic and a part by land by the way of Nuremburg, Leipzig, Cologne, and other cities of the interior.

While all this was happening there came out of the Orient itself a movement which resulted in a great enlargement of the trade with that section. It was the one occasion, prior to the second half of the century just ended, in which the Orient has shown a disposition to extend its trade relations with the Occident. The Mohammedan Empire, originating in the western part of that section which we still designate as the Orient, expanded rapidly in all directions until its boundaries reached the Atlantic Ocean on the west and India and China on the east, while its influence extended even farther eastward. This of itself might not have been of such material importance, but when it is considered that the Mohammedans were naturally a commercial people, and that Mohammed himself commended commerce and agriculture as "both meritorious and pleasing to God," it is not surprising that their area of control and influence stimulated commerce between Europe and the most distant parts of the earth. The products of Spain, Barbary, Egypt, Abyssinia, and southern Russia were carried from the West to Mecca, Damascus, Aden, and other cities of the East, and were there exchanged for the products of Persia, India, China, and the islands of the Indian archipelago. Slaves, tiger skins, cotton


JAPAN
IN
1904
JAPAN
IN
1874
FOREIGN COMMERCE
1874 $42,651,000
1904 $243,600,000

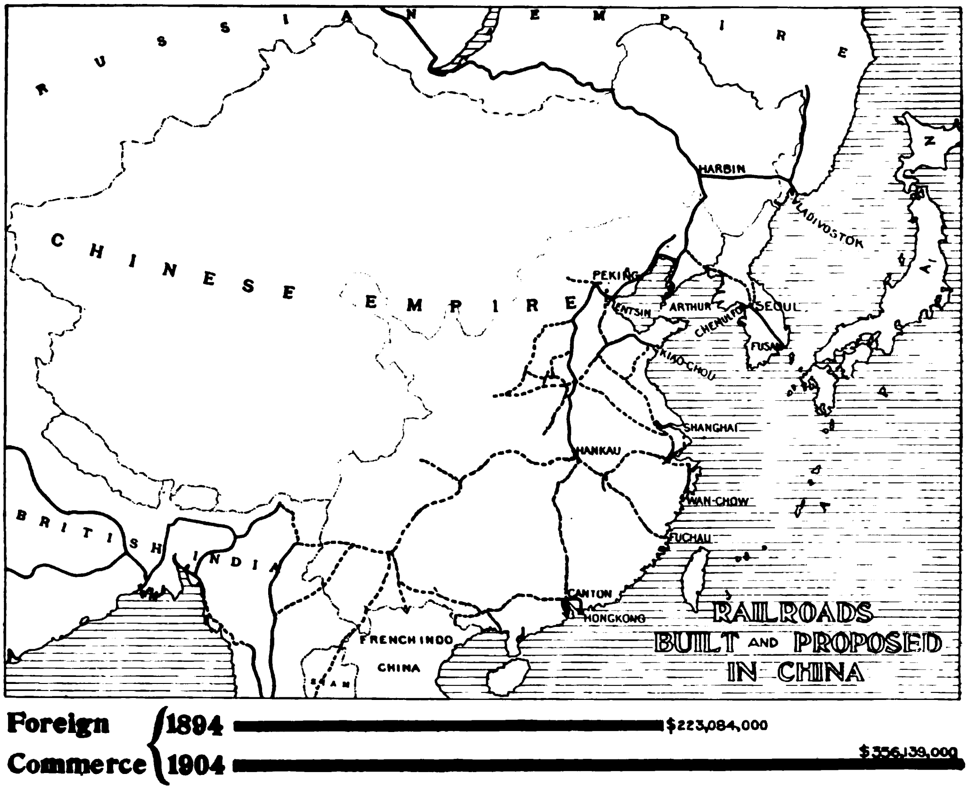
An Illustration of the Enormous Development of the Commerce of Japan Resulting from the Construction of Railways. See page 416



The Network of Railroads Covering India Today and the Resultant Vast Increase in Her Commerce. See page 416

goods, ivory, and gold dust came from Africa; leather, tapestry, cloths, copper, and iron from Spain and the adjoining territory, and these were exchanged at the points already mentioned for the silks, and spices, and woods, and carvings, and pearls, and precious stones from India and China.

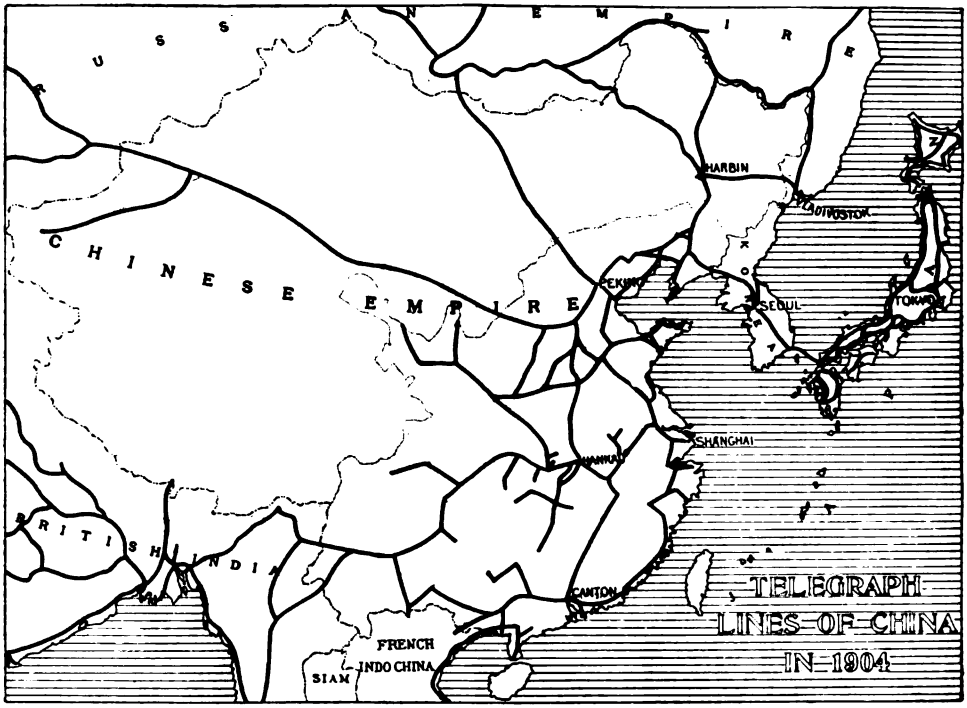
But the most important result to commerce and geography of this temporary extension of Oriental influence into the Occident was the acquaintance which it gave to the west with that important device of the Far East, the mariner's compass. While doubts have been expressed as to the origin of the compass, it is believed that it was developed by the Chinese many centuries before it was known to the West, and used in the desert by the Arabs, and that it was certainly introduced to the Europeans by the Mohammedans during their control of the countries fronting on the Mediterranean. Whatever its origin, its introduction in the West revolutionized conditions of commerce, navigation, and geographic knowledge. The ocean, formerly considered a barrier to com-


RUSSIAN EMPIRE
CHINESE EMPIRE
BRITISH INDIA
HARBIN
VLADIVOSTOK
PEKING
TIENTSIN
P. ARTHUR
CHEMULPO
SEOUL
FUSAN
KIAO-CHOU
SHANGHAI
HANKAU
WAN-CHOW
FUCHAU
CANTON
HONGKONG
FRENCH INDO CHINA
SIAM
RAILROADS BUILT AND PROPOSED IN CHINA
Foreign Commerce
1894
$223,084,000
1904
$356,139,000

Railways Constructed and Proposed in China

merce and exploration, became at once its highway. It gave a new stimulus to the efforts to find an all-water route by which to reach the commercial prize of the Orient, and the result was, first, the discovery of the American continent, and a little later two all-water routes to the very doors of the Orient, one of these by the Portuguese, around Africa and across the Indian Ocean, and the other by the Spanish, around South America and across the Pacific.

But the knowledge that the Orient could be reached by sailing around the continents at the south did not satisfy the people of northern Europe. The Portuguese, as the first explorers of the Indian Ocean, claimed the exclusive right of navigation in those waters, and the Spanish claimed a similar monopoly of the waters south of the American continents. As a result, the English and Dutch devoted their attention to efforts to find other water routes to the Orient, along the northern coasts of the continents of America and Eurasia. The Dutch sent expeditions to fight their way through the ice along the northern coasts of Europe and Asia; and England sent vessel after vessel to explore the northern coast of North America, each in the vain hope of finding a passage to China. For years the merchants of northern Europe waited in vain for the opening of a northwest passage to the Orient, until it finally

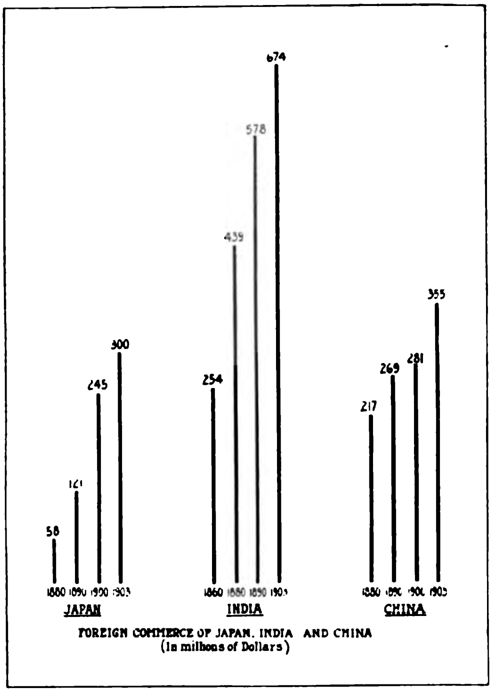


Telegraph Lines of China in 1904

became apparent that the water route to the Far East lay at the south only.

Finally, the theory of Grotius, that the high seas should be open to the vessels of all countries, prevailed, and then the struggle among modern nations for the commercial prize of the Orient was renewed with a vigor, greater, if possible, than ever before. Ships came and went at will over all seas and in all directions Great commercial companies were formed and chartered by their respective governments, their purpose being to trade with the Orient, and they gradually established trading stations on the coasts of India, China, and the islands of the East Indian archipelago. The commerce by way of the Mediterranean and the caravan routes rapidly declined, and sailing vessels from the countriesof western Europe landed their merchandise and silver and gold at the doors of the Orient, and returned laden with silks, and ivory, and woods, and spices, and with many other articles of the Orient formerly considered too bulky for transportation by the caravans of earlier centuries.

It may be interesting to pause for a moment here to study the cause of the anxiety of western men to find and maintain an all-water route to the Orient. Of course, the mere contrast of the cost of transportation by water with the cost on land was of itself of great importance, and especially at that time, when there were no railways, but there were other reasons. The land routes between western Europe and the Orient were extremely difficult. At the north the Ural Mountains interposed an almost impassable barrier; in the central region a great desert stretched almost continuously from the Mediterranean to India and China, and threatened the lives of men and animals which invaded it. At the south of that desert was that impassable mass of mountains known as "The Roof of the World"—the Himalayas.



A Comparison of Japan, India, and China Today. See page 416

RUSSIA AN EARLY ARRIVER IN THE ORIENT

Only by working through the passes in the Ural range and thence crossing the trackless wilds of Siberia was it possible for Europeans to reach the Orient by the land route; and it was by this route that one nation did find its way by land to the Far East, while the others were relying upon the water route. That nation was Russia. We are accustomed to think of Russia as a newcomer in the Orient, but in fact it was earlier in that field—much earlier than is realized by many who have but casually read the history of that persistent people. Even before the discovery of America the Russians were looking over the Urals toward the east and making short incursions into the territory which they were destined to occupy. By the year 1580 they had established permanent settlements in the eastern part of what is now known as Siberia. By 1620 they were half way to the Pacific; by 1638, only eighteen years after the Pilgrim Fathers landed at Plymouth Rock, they had actually established themselves on the Pacific coast; by 1741 they had crossed Bering Sea into northwestern America, and before the adoption of our Constitution they had established a permanent settlement in Alaska, where they remained until the purchase of that territory by the United States, in 1867.

But beginning with the middle of the last century there came a new and marked development of the commerce of the Occident with the Orient. Prior to 1842 all trade in China was carried on through the "Hong merchants," designated by the Chinese government as intermediaries for trade with foreigners.

In 1842 the British government, through what is known in history as the "opium war," forced the Chinese government to open five ports to the trade of its vessels, and two years later similar privileges were given to the United States, and shortly thereafter to other countries, and these "treaty ports" have been increased from time to time until they now number about forty. In 1854 Japan, upon the insistence of the United States, opened its doors to our commerce, and a little later to other countries of the world. In 1858 the British government took the entire control of India and began the work of developing its commerce by constructing canals, roads, and railroads. In 1869 the Suez Canal was opened, shortening by several thousand miles the water route between the Occident and the Orient.

But there are other great changes during the century just ended which had an equally important effect upon the commerce of the whole world and upon the exchanges between the Orient and the still expanding Occident. Prior to 1800 most of the manufacturing of the world was still performed by hand, and largely in the household. Now machinery, driven by steam or the power of the waterfall, performs, under the guidance of a single individual, tasks which would have required hundreds of persons to perform a century ago. Then the products of the interior could only be carried to the seaboard by man or animal power, or at the best by floating them in oar-propelled boats upon the streams which made their way to the ocean. Now railways penetrate all parts of the great interior and carry the natural products to the water's edge for exchange with other countries and continents. At the beginning of the century all exchanges between the continents were carried by slow sailing vessels, whose carrying capacity was small and danger of loss great. Today the bulk of the international commerce is carried by great vessels propelled by steam, and the cost of transportation is reduced to a small fraction of that of a century ago. In 1800 there were no methods of communication on land save by the post-rider, and none on the ocean other than that furnished by the slow sailing vessel, whose speed was subject to the caprices of nature as expressed in winds or storms or calms.

THE POSSIBILITIES OF COMMERCE HAVE BEEN MULTIPLIED BY INVENTIONS

Today the producer at the most interior point of the Occident may speak with the consumer in the distant Orient, the message flashing across the land and under the ocean in less time than is required to describe the process. The merchant of New York who a century ago sent his order to China by sailing vessel might consider himself fortunate if he received the merchandise within a full year, while now the dealer in the most distant city of our great interior may wire his order in the morning with the knowledge that the goods may before night be placed on board a fast steamer and reach him within less than a month.

In 1805 the world had not a single steamer upon the ocean, a single mile of railway on land, a single span of telegraph upon the continents, or a foot of cable beneath the ocean. In 1905 it has over 18,000 steam vessels, 500,000 miles of railway, and more than 1,000,000 miles of land telegraph, while the very continents are bound together and given instantaneous communication by more than 200,000 miles of ocean cables, and the number of telephone messages sent aggregates 6,000 millions annually, and one-half of them in the United States alone.

The effect of this enormous increase in the power of production, transportation, and communication has been to multiply commerce in all parts of the world. The world's international commerce, which a single century ago was less than two billions of dollars, is now 22 billions, and the commerce of the Orient, which was less than 200 million dollars, is now nearly 3,000 millions.

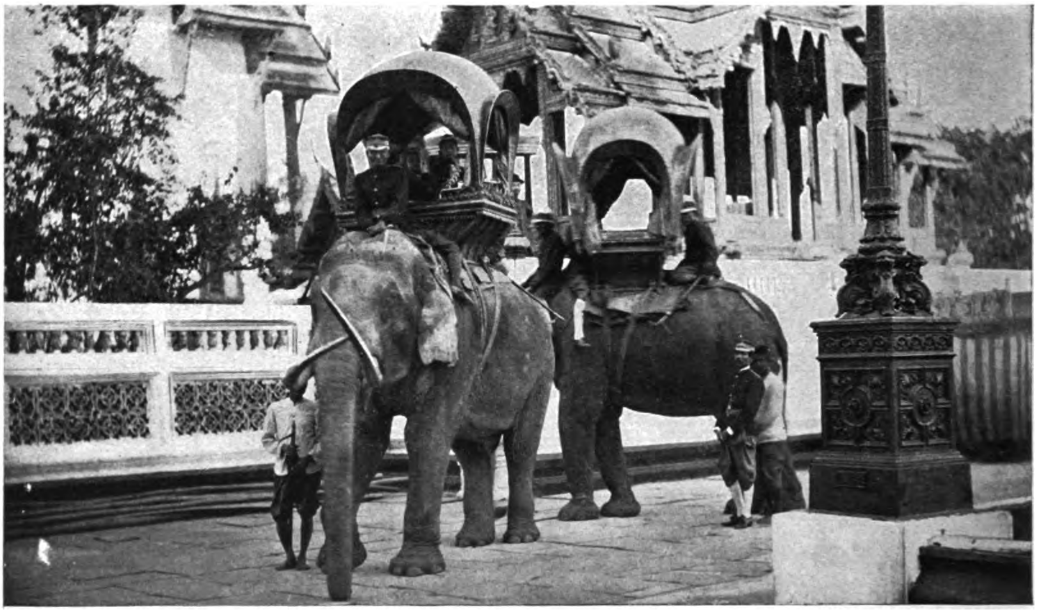
THE COMMERCE OF THE ORIENT IS INSIGNIFICANT WHEN COMPARED WITH THAT OF THE REST OF THE WORLD

But this commerce of the Orient, amounting to nearly 3,000 millions of dollars annually, is yet small when compared with its area and population, and thus its possible producing and consuming power. The population of Asia and Oceania is 850 millions, while that of all other parts of the world combined is but about 750 millions. Its land area is 18 million square miles, and that of all other parts of the world 34 millions; yet its commerce is slightly less than three billions of dollars, and that of other parts of the world 19 billions. This gives an average commerce in the entire Orient of about three dollars *per capita* per annum, while the average in all the rest of the world combined is 27 dollars *per capita* per annum. Thus the Orient, which has more than one-half of the world's population and more than one-third of its land area, has now but one-ninth as great as the average *per capita* in all other parts of the world combined.

THE ORIENT HAS BEEN HANDICAPPED BY LACK OF MEANS OF TRANSPORTATION AND COMMUNICATION

Now, what is the cause of this lack of commercial development in the Orient? With half the world's population and all the attention which the world has given it during the past four thousand years the commerce is yet but one-eighth of the total world's commerce and one-ninth as large *per capita* as that of the remainder of the world. While its growth, considered by percentage of increase, has of late been as rapid as other parts of the world, its total, when considered from the standpoint of area, population, and producing and consuming possibilities, is ridiculously small.

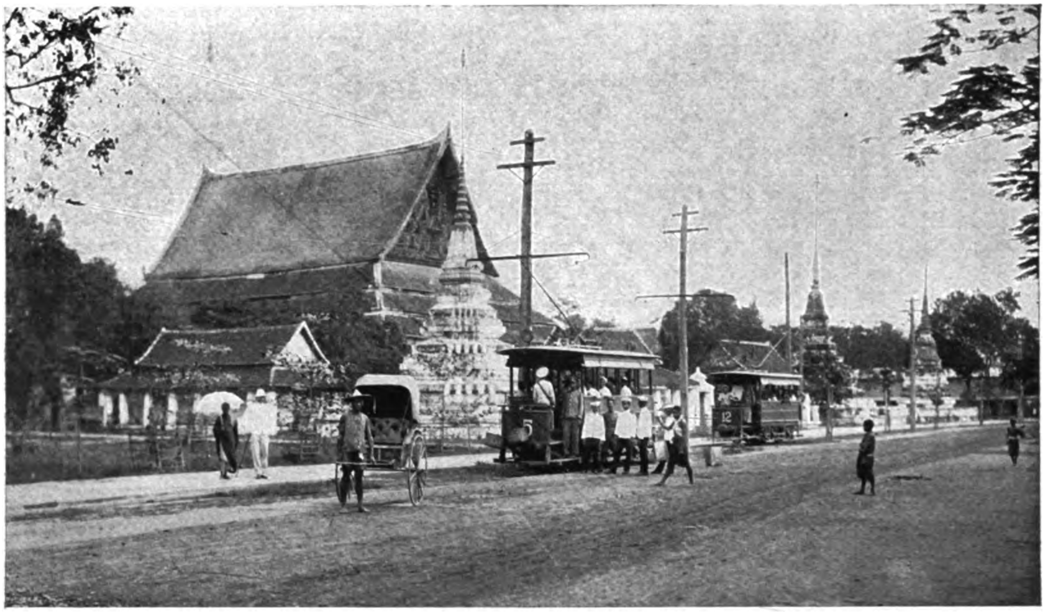
What is the cause of the slow commercial development of the Orient?



From "Kingdom of Siam." Copyright, 1904, G. P. Putnam's Sons

Elephants with Howdahs (Bangkok), which Have Been Eclipsed in Popularity by the American Trolley Car on Opposite Page

Can that condition be overcome by the application of those agencies which have caused the greater and more rapid development in other parts of the world? The answer to these questions is not difficult. The world's commerce has developed in conjunction with and as a result of the development of facilities of transportation and communication. Without steam power for transportation and electricity for communication the world had but a single century ago less than two billions of international commerce. Now, with the steamship and railways and telegraphs, it has over 22 billions. Of this growth of over 20 billions in the last century but little more than two billions occurred in the Orient and about 18 billions in other parts of the world. What is the cause of this great disparity of growth? A glance at a map of the world, showing the facilities for transportation and intercommunication in its various great sections, will, in some degree at least, answer this question. Where it is, of course, practicable for the progressive, commercial people of the Occident to send their steamships to the doors of the Orient in pursuit of the commercial prize of that part of the world, the Orient itself cannot send its products from the great interior to the ocean ports without railroads; and here is at least a partial answer to the question. That section of the world which we are considering as the Orient, while it has more than one-half of the population and one-third of the land area of the world, has but about one-tenth of the world's railways and less than one-tenth of its telegraph lines. Can there be any doubt that this is at least one of the great causes of the fact that it has



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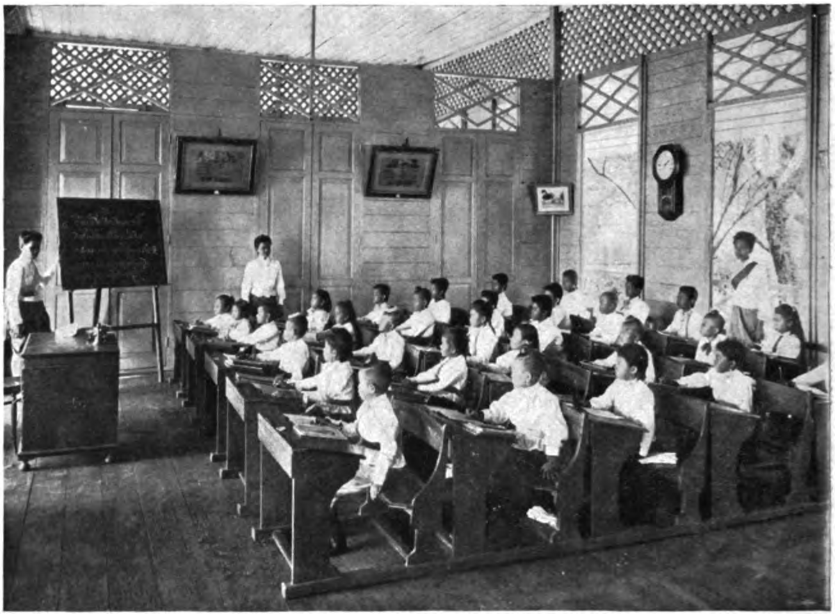
Bangkok Tramway



From "Kingdom of Siam." Copyright, 1904, G. P. Putnam's Sons

The Awakening of the East. A School for Girls, Bangkok

but one-eighth of the world's commerce? The people of the Orient are, as a rule, industrious, painstaking, and now disposed to commercial intercourse with the Occident, but without facilities for transporting their products from the interior to the seaboard, where they may sell or exchange them for products of the other parts of the world, they are powerless to develop a great commerce.

THE RECENT DEVELOPMENT OF INDIA AND JAPAN COMPARED TO THAT OF CHINA

It is apparent, from this comparison of the railways and telegraphs of the Orient with those of the Occident, that the small *per capita* of commerce in the Orient is due, in part at least, to the lack of facilities for transportation and communication on land; and there is a means by which this theory can be tested. There are, in the Orient, two countries which have been sufficiently supplied with railways in recent years to enable us to determine, with some degree of accuracy, their effect upon Oriental commerce. While their railway mileage is yet small in comparison with that of the great commercial countries of the Occident, it is sufficient to justify a momentary study as to the growth of commerce which has followed that development. These two Oriental countries in which railroads have developed, or at least began to develop, are India and Japan. India has about 28,000 miles of railway and Japan about 4,500 miles. True, these countries in each case have but about one mile of railway for each 10,000 inhabitants, while in the United States we have one mile for each 400 inhabitants, yet the contrast in the commerce of

From "An American Engineer in China," by William Barclay Parsons
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A Group of Chinese Watching an American Railway Engineer

Japan and India, when compared with that of other Oriental countries having practically no railways, is at least suggestive as to the effect of railways upon commercial development.

The three great countries of the Orient are China, India, and Japan. They have about nine-tenths of the population of what is generally known as the Orient, and the relative development of commerce among these three great groups of Oriental people which are or are not supplied with railways should be at least suggestive as to the effect of railways upon commerce and commercial growth. Railway construction in India began about 1853, but did not make rapid development until more recent years. In Japan railway-building began about 1872, but most of the development has occurred during the past decade. In China nearly all of the railway now existing has been constructed since 1900, and under circumstances which have not permitted its development as a system which would have material effect upon commerce. We may, then, fairly compare the growth of commerce in these three great Oriental countries, two of them with young but rapidly developing railway systems, the other with practically none.

The foreign commerce of China, with its 400 million industrious people, but no railways, has grown but 160 million dollars since 1870; that of India, with 300 millions of people and a system of railways, has grown 258 millions, and that of Japan, with only 45 millions and a system of railways, has grown 215 millions. The Chinaman is known by those familiar with the conditions in the Orient as a natural trader and business man. A large share of the trade in the Orient is in the hands of the Chinese, and the positions of trust in the great banking establishments are largely held by Chinamen, yet, despite these commercial characteristics of the Chinamen, the foreign commerce of China, with no railway system, is but 85 cents *per capita;* that of India, with 28,000 miles of railways, is about $2.25 *per capita*, and that of Japan, with 4,500 miles of railways, is $5.86 *per capita*. In other words, the commerce of China, without a system of railways, is about one-third as much *per capita* as that of India and one-sixth as much *per capita* as that of Japan, each of which has one mile of railway for each 10,000 inhabitants.

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Transportation in China

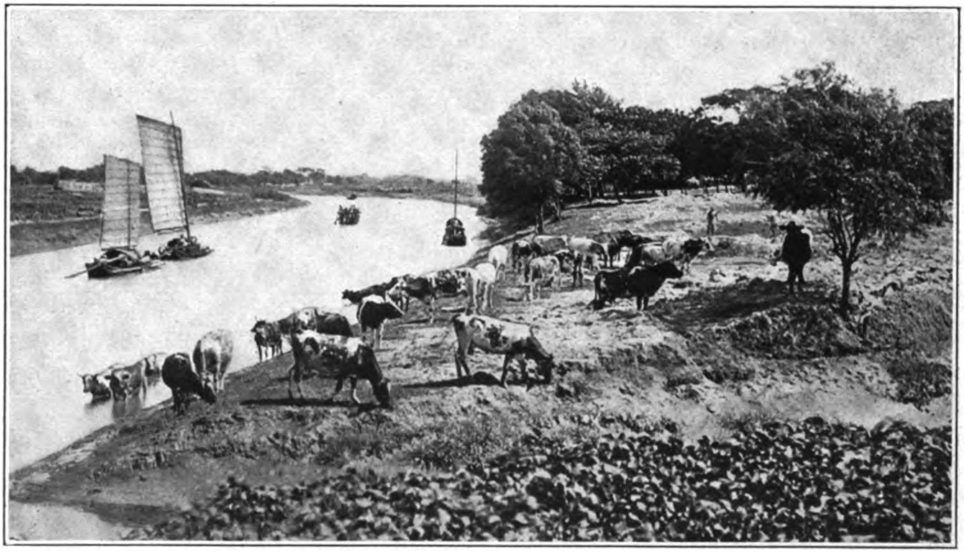
Junks on the Han River with Hankow in the Distance

PROJECTED RAILWAYS IN THE ORIENT

But there is another feature of this recent railway development in the East which must be considered as likely to prove of great importance in the future relations of the Orient with the Occident. China has 2,000 miles of railway, most of it connected with the great Trans-Siberian line, and several thousand miles more have been authorized or definitely proposed. French Indo-China, lying just at the south of China, has over 1,000 miles constructed and many new lines projected, while the Malayan Peninsula, still farther at the south, has some 300 miles, Siam about 350 miles, and Burmah 1,500 miles. The French Indo-China system is to be connected with the railways of China by a line 230 miles long, now under construction, at a prospective cost of some 20 million dollars. The railway lines under construction or projected in China promise to extend to her southwest border, where a few hundred miles of railway would connect them with the systems of Burmah, which in turn will connect with that of India, about 28,000 miles in length. From India the railway system again stretches westward into Persia, and the construction of but a few hundred miles would put this great system into communication with the 2,000 miles of road in Asiatic Turkey, which in turn connects with the railways of southern Europe, while a comparatively short stretch of road at the north of India would also connect the Indian railway system with that of Russia. While it is a fact that serious political obstacles to some of these unions of railway systems now exist, it is not unlikely that the demand of commerce will in time be sufficiently strong to overcome or sufficiently modify these political conditions to render possible a union of these numerous systems, great and small, so far as relates to an interchange of passengers, freights, mails, and the establishment of other transportation systems between the railroads of Europe and those of Asia. Already the great Siberian Railway connects the system of Europe with that of China at the north, and, now that the construction of a few short links would furnish another continuous line from China to Europe at the south, we may confidently expect that the traveler may, within a comparatively few years, make the entire circuit of Eurasia by rail, traveling comfortably from Paris through the countries of northwestern Europe, Russia, and Siberia, into China, and thence southward through Indo-China, Burmah, India, Persia, Turkey, and the countries of southern Europe to the place of starting. The development which would come to the commerce of Europe with the Orient through the operation of this great railway circuit of the Eurasian continent could but be of great importance.

While it is a fact that the Orient, with more than half of the world's population and one-third of its land area, has now but one-tenth of its railways and telegraphs, and one-eighth of its commerce, we are not justified in considering its commercial prize as of little value, present or prospective. The total commerce of Asia and Oceania, which we may broadly consider under this title, is nearly three billions of dollars, about equally divided between imports and exports, and its percentage of growth, even with the limited railway facilities offered, has been quite as rapid in recent years as that of the more favored Occident. The commerce of India is four times as great as when its railway system was begun, and that of Japan is six times as great as at the beginning of the construction of its railroads, and we may therefore expect that the development of the great railway systems now projected in China, Korea, Indo-China, Siam, Burmah, Malayan Peninsula, the Dutch East Indies, and the Philippines, with the additions planned for India, Japan, Siberia, and Australia, will enormously increase the commerce of that part of the world.

The imports of all the countries and islands of Asia and Oceania now amount



From C. L. Marlatt, Department of Agriculture

On One of the Interior Canals of China

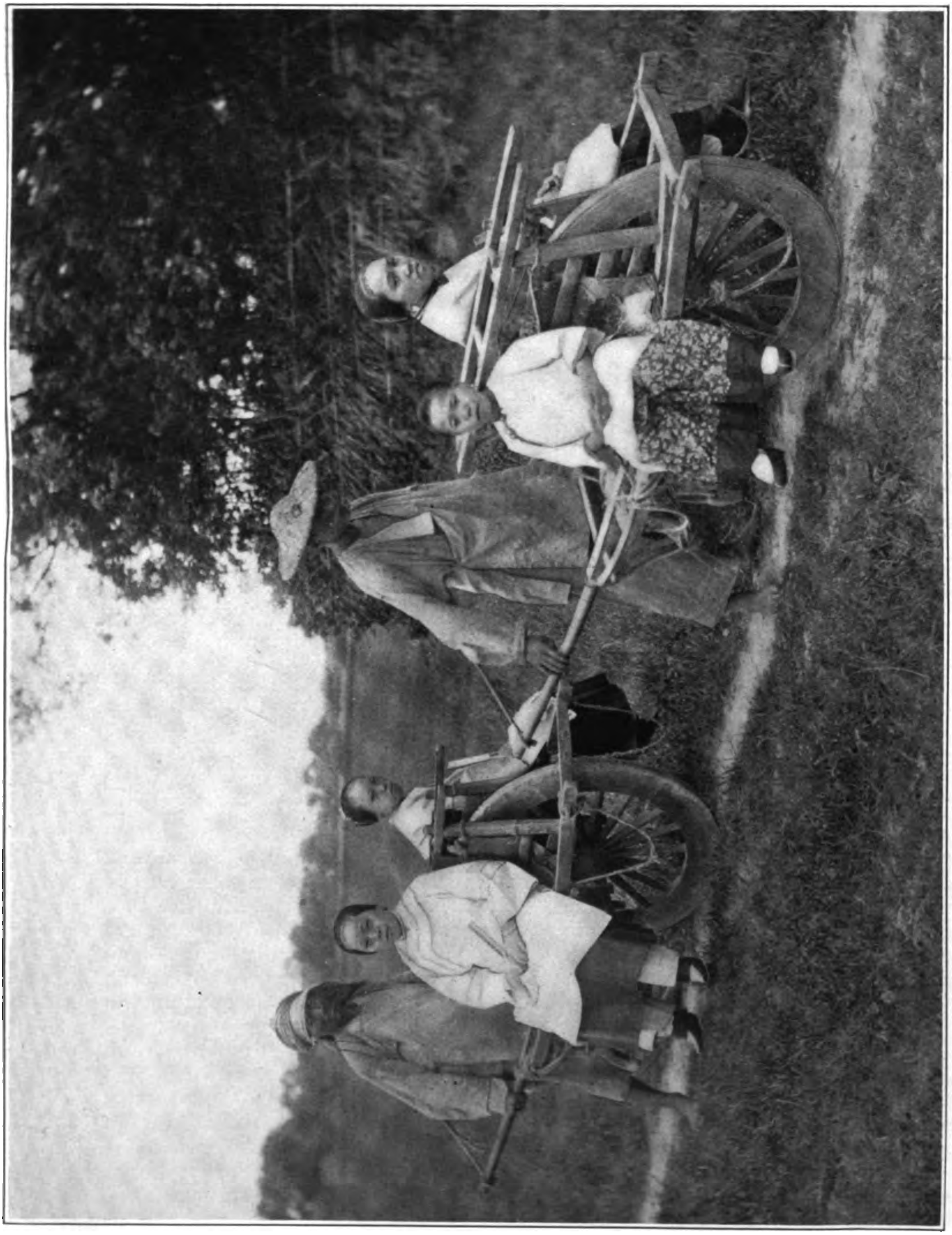
From C. L. Marlatt, Department of Agriculture

Transportation in China. A Country Cart

to nearly as much as the total exports of the United States. At present we supply but about 8 per cent of that great importation, and it needs but a moment of reflection to realize what an addition it would give to our foreign trade if we could treble or quadruple our shares in the growing imports of that great section.

OUR PROSPECTS OF INCREASING OUR SHARE IN THE COMMERCE OF THE ORIENT VERY BRIGHT

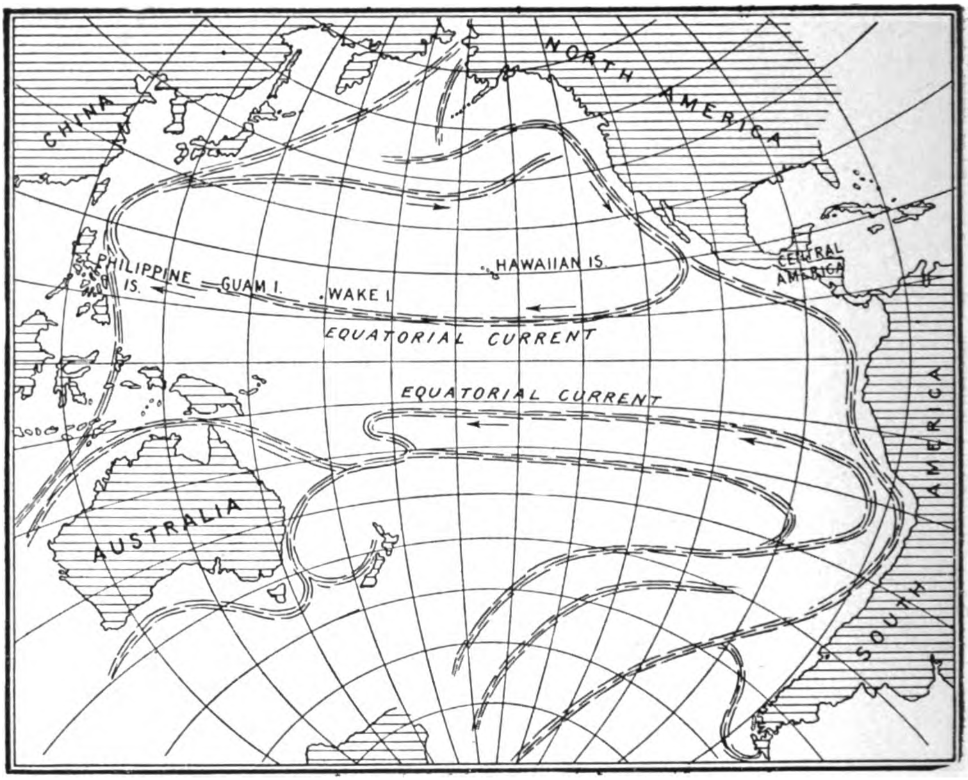
What are our prospects of increasing our share in that commerce? Europe is, of course, our chief rival in the attempt to supply the imports of the Orient. The European countries, including the British Isles in this term, send to Asia and Oceania about 600 million dollars' worth of merchandise annually, and the United States sends about 100 millions; and we are gaining ground in the Orient even more rapidly than are the European countries. The imports of China, Japan, and Australia from all the European countries combined show an increase in 1903 of but 45 millions as compared with 1890, while their increase in importations from the United States alone in the same period was 49 millions thus showing that our gains in their import trade are actually greater than those of all Europe combined. Comparing the total imports of all Asia and Oceania in 1903 with those of 1890, we find an increase of about 22 per cent in the imports from all Europe and of 160 per cent in the imports from the United States



From C. L. Marlatt, Department of Agriculture

Transportation in China

The wheelbarrow has served as carriage and cart throughout many sections of the Empire for many centuries



The Air and Water Currents of the Pacific. See page 422

But there are special reasons why we may expect to increase our share in the trade of the Orient, and especially our share in supplying its imports. The Orient produces large quantities of the class of merchandise which we must import, and imports equally large quantities of the class of merchandise which we produce and desire to sell. Our imports of raw silk, and tea, and hemp, and jute, and tin, and goat skins, and other articles of the class produced in the Orient amount to hundreds of millions of dollars annually, and our imports from Asia and Oceania have grown from less than 32 millions of dollars in 1870 to 190 millions in 1904. The Orient is a large importer of cotton and cotton goods, mineral oils, manufactures of iron and steel, flour, and meats, in all of which the United States is the world's largest producer.

The imports of cotton goods alone into the Orient amount to 250 million dollars per annum, and in this trade we should have a large share. We produce three-fourths of the world's cotton, and our factories are turning more and more of it into the manufactured form each year, and there seems no good reason why we should not supply at least one-half of the cotton goods imported into the Orient instead of less than one-tenth, as at present. Our production of mineral oil, fit for use in lighting, of which the imports into the Orient are about $35,000,000 annually, is larger than that of any other country, and we should not only retain but increase our trade in this article. In iron and steel, in which the Orient is rapidly increasing its imports, we are the largest producers in the world, and should therefore enlarge our share in supplying that trade. The natural advantages which we have in supplying that section of the world were shown by the large orders for flour and meat and many other articles which were poured in upon the dealers of the United States at the opening of the Russo-Japanese war, and these hurry orders came from both governments, which thus agreed at least upon one point—that the United States is a natural source of supply for that great section, at least in these important requirements.

THE ADVANTAGES WHICH WE HAVE

But there is another condition which should and will give us marked permanent advantages in the commerce of the Orient. We are about beginning the construction of the great Isthmian Canal, for which the world has waited so long, and which, when completed, will place our great producing and manufacturing sections of the East and South in direct water connection with all parts of the Orient. Our Mississippi Valley is the world's greatest producer of breadstuffs and meats; the South, the world's greatest producer of cotton; our great iron fields are the world's largest producer of that important metal, and our manufacturing system is the greatest in the world. When all of these great fields of supply are given direct water communication with the Orient, they should be able to largely increase our contributions to her requirements, and the 100 millions of merchandise which we now send each year to the Orient should grow to at least 500 millions.

Not only have we marked advantages in the fact that we are the world's chief producer of the articles which the Orient requires, but we have other natural advantages in our relations to the Pacific Ocean, which is to prove the chief highway for the commerce between these two sections and peoples. We have a much greater frontage on the Pacific Ocean than any other nation, and better harbors, not only upon the mainland, but also the principal island harbors of the entire ocean. Our national frontage on the Pacific, considering only the number of nautical miles to be protected, patrolled, or lighted, is 12,500, while that of the United Kingdom is 10,000, Russia a little over 6,000, Japan a little less than 5,000, and China little more than 3,000 miles, so that our frontage upon the Pacific exceeds that of any other nation.

Not only have we marked advantage in frontage harbors, but in facilities for direct communication the developments of recent years have been of great importance. The experience of cable builders and operators shows that ocean cables cannot be operated more than 3,000 miles without relay stations, and the fact that the islands scattered through the Pacific were formerly under the control of foreign nations with varied interests delayed greatly the construction of a trans-Pacific cable. Now, however, that the United States flag floats over Hawaii, Wake Island, Guam, and the Philippines, it has been practicable for American capital to string upon these great natural telegraph poles a line of wire which now connects all parts of the United States with the great business centers of all Asia and Oceania.

I cannot close this discussion of our natural advantages of our trade with the Orient without again calling your attention to another condition presented in an address before the Society in 1902, an address which the Japanese government has done me the honor to reprint in its own language for distribution throughout Japan. In that address I said:

"In certain great natural conditions, which are as unchangeable as the oceans and the continents and the revolution of the earth itself, nature has given to the United States marked advantages regarding the movement of vessels between her western shores and the eastern coast of Asia, where the trade of the Orient must always enter, and in this belief I find myself fully supported by the practical opinion and experience of distinguished officers of the American and British navies and by men who have had long experience in the commerce of that great ocean. These advantages to which I allude are found in the great and permanent currents of air and water which flow westwardly across the Pacific in the vicinity of the equator, turning northwardly along the coast of Asia, and, following the Japan coast, again move toward the east across the north Pacific and down the western coast of North America to the point of beginning. In the map herewith presented are shown the ocean currents and the currents of air, the direction of the movement in each case being shown by arrows. It will be seen that the equatorial current begins its westward movement at the very point in which vessels from an isthmian canal would enter the Pacific, and moves steadily westward to the vicinity of the Philippines, then, turning northward along the coast of China and Japan, is deflected to the east, flows eastwardly across the north Pacific to the American coast, and then moves down the western coast of the United States to the point of beginning. The air currents, while their exact location is somewhat affected by the changes of the seasons, follow practically the same lines and are equally certain and reliable.

The rate of speed at which this ocean current flows in its great circular movement across the Pacific and return is probably on an average of about one mile per hour, or 24 miles per day, while the rate of the movement of the air currents is, of course, much more rapid. While there is a general belief that vessels propelled by steam are little affected by favorable or adverse winds, a series of experiments recently made by German navigators and scientists shows that even with high-power steam vessels of modern type a difference of from 50 to 100 miles per day is realized in traveling with or against winds of any considerable power. These facts, it seems to me, justify me in the assertion which I made, and now repeat, that this steady, permanent flow of air and water—a flow which will never cease so long as the earth revolves toward the east and the great bodies of land and water retain their present relative positions—must always give to the North American continent a marked advantage in the commerce of the Pacific. Its vessels from the eastern coast, entering the Pacific at the Isthmus, will move westward, aided by air and water currents, past our Hawaiian Islands, Wake Island, and Guam to the Philippines; thence northward to those two great trade centers, Shanghai and Yokohama, and thence, still following these currents, will move to the east along that shortest route known as the 'great circle,' in the north Pacific, touch at our western ports for transshipment of freights for the East, and then, still following the ocean current down our Pacific coast, will reach the entrance to the Isthmian Canal, having been aided by favorable currents of air and water in the entire circular tour of 18,000 miles. The feasibility of this plan is found in the fact that, while the actual sailing distance from the western end of the proposed Isthmian Canal to Manila via Hawaii and Guam is 9,500 miles, the return trip from Manila via Shanghai, Yokohama, and San Francisco to the canal is but 10,000 miles, with the advantages of favorable wind and current in practically every mile of the entire distance."

Aryan man, the great explorer and trader and civilizer of the world, is about to complete his circuit of the globe. Beginning his career of activity in the western section of the Orient, he sent one branch of his family eastward into India and Burmah, while the more progressive and vigorous branch turned its face resolutely toward the setting sun. Westward, through the mountains and valleys and plains of Europe, he marched until he reached the Atlantic, sending thence a thin line eastward by way of the northern and southern routes, to begin the flanking movement upon the commerce of the Orient, while the main body of his forces still moved resolutely to the west, across the Atlantic. In America he halted for a time, until he had peopled and developed that magnificent section of the world, and then he began his final movement upon that great commercial prize, to which his eyes had been turned for thousands of years. Building his railways across the American continent and laying his cables beneath the waters of the Pacific, he moved steadily across that great ocean, step by step and island by island, and today Aryan man, American man, stands in the Philippine Islands knocking at the doors of Asia, inviting the nations of that great continent to admit him to a peaceful interchange of commodities, and with that a development of friendship which shall be strong and lasting and beneficial to the whole world.

MAPS RECENTLY PUBLISHED BY THE U. S. GEOLOGICAL SURVEY*

THE OURAY QUADRANGLE, COLORADO

THE only important town or settlement in the quadrangle is Ouray, a city of 2,500 inhabitants, which is the southern terminus of the Ouray branch of the Denver and Rio Grande Railroad. Ouray, which is widely known as a gold and silver mining camp, produces a daily output of gold alone approximating $10,000 during a large part of the year. Among the mines tributary to this town is the well-known Camp Bird mine.

The town of Ouray is most picturesquely situated. This beautiful region of massive and vari-colored mountains, tinted in autumn with all the blends of quaking aspen and mountain spruce, well deserves its local appellation, "The Switzerland of America." East of Ouray lies a vast arena, 1½ miles in diameter and 1 mile in vertical depth, called "The Amphitheater," which is surrounded by superb volcanic walls that make it well nigh inaccessible. Farther southwest Canyon Creek enters Ouray through a box canyon so deep and narrow that it is said sunlight never enters there. Trails have been blasted in the quartzite walls and a portion of the canyon has been tunneled, so that the visitor may better inspect the dark recesses. Two miles south of town begins the Bear Creek trail, which is said to offer more magnificent scenery than any other bridle route in the West.

One of the very few old overland stage coaches now left in the West runs daily between Ouray and Red Mountain. Its route makes the closing link of 10 miles, through a country inaccessible to the railroad, in the famous "Around the Circle Route" of 1,000 miles, which is made wholly in the state of Colorado. Much of the stage road is cut from nearly vertical rock midway on the flank of a huge mountain at a cost, in places, of nearly $50,000 a mile. To travel along this road on the top of a stage drawn by six horses at a trot—"two in the tongue, two in the swing, and two in the lead"—gazing alternately into dizzy depths below and lofty heights above, is to have an experience that is never forgotten.

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*The price of these maps is 5 cents each. They may be obtained on application to the Director of the U. S. Geological Survey, Washington, D. C.

THE NEEDLE MOUNTAINS QUADRANGLE

The Needle Mountains are well worthy of special mention. They are extremely ragged in appearance, with snowbound summits, sharp as needles. Mostly inaccessible, they are seldom visited, and, save a landmark here and there, are yet unnamed. More than a hundred peaks rear their splintered pinnacles to heights exceeding 13,000 feet above sea level. Mount Windom, which attains a height of 14,084 feet, is the culminating summit.

The Animas Canyon, in the Needle Mountains, is one of the deepest furrows in a state famed for rugged topography. The tourist rail route creeps through 20 miles of this canyon valley, the granite sides of which tower from 3,000 to 6,000 feet above the track.

The triangulation for these maps was done by Mr W. M. Beaman. In the execution of the fieldwork Mr Beaman was assisted by Messrs J. F. McBeth and Arthur Stiles, assistant topographers, and a corps of field assistants. Field work at altitudes of 12,000 to 14,000 feet presents unusual difficulties. With only two-thirds of a sea-level atmosphere to breathe, and that so exhilarating as to make one's energy seem inexhaustible, care has to be exercised lest heart and lungs be over-stimulated. As the Needles form the crown of a mountain mass which is first in the path of the moisture-laden winds blowing overland from the Gulf of California, local thunder storms, accompanied by vivid lightning, are very frequent. On several occasions it happened that Survey topographers were caught on isolated peaks during such storms, where they were (to state the case mildly) strongly impressed by a sense of insecurity on account of their own snapping hair and the sparks emitted from noses and fingers, as well as from the metal parts of their instruments. The quaking of their knees under these conditions they subsequently attributed to powerful electric shocks.

The working season is short in these high altitudes. Snow drifts block the high passes often until July 1, while two feet of snow around the tents in September is not unusual. Nevertheless, besides determining by means of triangulation the heights of the numerous lofty peaks, several circuits of primary spirit-leveling of great accuracy were run. For total rise and fall per mile above 10,000 feet and for elevations of passes crossed, these circuits surpassed any similar level work ever done in the world.

THE CRIPPLE CREEK DISTRICT, COLORADO

The revised map of the Cripple Creek mining district shows the wonderful development of that great camp since 1894, when the first map was made. Gold had been discovered there only a short time before, and Cripple Creek was then merely a temporary camp, hastily thrown together to shelter a moving population of eager prospectors and excited speculators.

Since then the mining camps of Cripple Creek and Victor have become cities, and the little outposts of the earlier day are now known as the towns of Goldfield, Independence, Elkton, Anaconda, Altman, and Arequa. Numerous fires removed a large number of the first cabins and shacks, and in their places have arisen handsome substantial structures of brick and stone that would be a credit to any city. Complete electric lighting plants, extensive waterworks, interurban electric and steam railways, and many other appurtenances of civilization are now conspicuous features of the landscape.

These changes are shown on the new map by a careful and accurate representation of every detail that is of sufficient size to receive recognition on a map drawn to a scale of 2½ inches to the mile, as this one is. So numerous have been the changes in this area during the last ten years that the two maps are hardly recognized as representative of the same area. Almost every cultural feature has been replaced by an improvement, and in places the shapes of the hills themselves have been altered. This is very apparent to any one who stands on one of the higher streets in Cripple Creek and observes the slopes of Gold Hill. Immense numbers of mine dumps and surface workings have destroyed the original contour of the mountain and given it an altogether different outline.

THE LONG LAKE QUADRANGLE, NEW YORK

Forest and lake are the most characteristic features of this area. The merest glance at the map shows that here the sportsman may realize his ideals and the lover of nature may rest content.

THE ST REGIS QUADRANGLE, NEW YORK

This is the most interesting and varied part of the country so far mapped in the Adirondack Mountains. The most characteristic feature of this quadrangle is the large number of ponds and lakes which it contains. There are nearly 200 of them. Many have no visible inlets or outlets and are separated by small terminal moraines from other ponds, which are only two or three feet higher or lower. Some of them are so connected as to furnish an unrivaled waterway through the woods.

The control on this quadrangle was furnished by Messrs E. L. McNair and George H. Guerdrum, and the topography was done in coöperation with the state of New York under the supervision of Mr Glenn S. Smith.

THE ROGERSVILLE QUADRANGLE, PENNSYLVANIA

About two-thirds of the area embraced in this map is used as farming or grazing land. The soil washed down by rain from the hilltops makes the farms in the valleys very rich. The hilltops themselves are used mostly as pasture land. Large numbers of sheep and cattle are exported every year from this region.

Considerable tracts in this area are covered with timber, but it is all a second growth of chestnut and oak and has no commercial value.

The whole area is underlain by the Pittsburg vein of coal. A low grade of coal outcrops around Durbin and Crabtree and is used only for local consumption.

Natural-gas wells are found all over the area and natural gas is the favorite fuel of the people in this region.

The triangulation for this map is the work of Mr Sledge Tatum. The topographic work was done by Messrs R. D. Cummin and E. G. Hamilton, under the direction of Mr Frank Sutton.

THE DENTON QUADRANGLE, MARYLAND

It embraces parts of Talbot, Queen Anne, and Caroline counties. If not literally a land of milk and honey, it is certainly one of peaches and tomatoes. It is one of the finest farming sections in the United States for small fruits and vegetables.

The farms in this part of Maryland are unusually large and well cared for. The climate is delightful, the soil fertile. Even where there is sand it is usually a sandy loam rather than just unqualified sand.

Nearly every village has its canning factory, and during the preserving season the hum of industry is loud. Facilities for marketing garden produce are, fortunately, excellent. This area was surveyed in 1904 in coöperation with the state of Maryland. The topographic work was done by Messrs Robert Coe, T. G. Basinger, and L. S. Leopold. The control was established by Messrs G. T. Hawkins, W. Carvel Hall, E. S. Ela, Carroll Caldwell, and R. L. Harrison.

THE OKANOGAN QUADRANGLE, WASHINGTON

The town of Bruster, on the Columbia, is the chief settlement in the quadrangle. In times of high water a boat plies from Bruster up the Okanogan to Riverside.

The topography for this map was done by Mr L. C. Fletcher, who was assisted by Mr W. C. Guerin. The triangulation was the work of Mr C. F. Urquhart.

THE SKYKOMISH QUADRANGLE, WASHINGTON

In this lofty region some of the grandest mountain scenery on the continent may be enjoyed by passengers on the Great Northern Railroad, which runs east and west through the center of the quadrangle. By means of the Great Cascade tunnel, which is only a few feet short of 2 miles in length, the railroad pierces the summit of the mountain range and descends by tortuous windings about 2,600 feet within the quadrangle. One of the most striking scenic features along the road is Index Mountain, a great granite pinnacle nearly a mile high, which looks like a huge copy of the Leaning Tower of Pisa.

Many beautiful glacial lakes lie along the slopes of the mountains. Opportunities for the development of water power are numerous. A short distance west of this quadrangle are Snoqualmie Falls, whence comes the power which generates electricity for Seattle.

Very good grazing lands are found in the northeast corner of the quadrangle, where many sheep browse during the summer.

The principal town of the region is Skykomish. Situated on the line of the Great Northern Railroad and on the Skykomish River also, it is the chief source of supplies for the miners throughout the quadrangle. Large lumber mills are located there.

The topographic work within the Washington Forest Reserve was done by Mr T. G. Gerdine in 1897. The rest of the quadrangle was surveyed in 1902, under the general supervision of Mr A. E. Murlin, by Messrs Murlin, C. W. Sutton, and W. C. Guerin.

THE WAYNE QUADRANGLE

This is a part of the richest and most populous county in the state of Michigan. The chief topographic feature of the quadrangle is the ancient bed of Lake Erie, which extends from the 600 to the 720-foot contour, to the old shore line, or Belmore beach, running through Plymouth and Farmington to the northeast. Northwest of the Belmore beach the surface is a broken terminal moraine.

The principal occupations of the people of this area are farming, dairying, and the raising of fruits and vegetables. In the larger villages there are some small manufacturing establishments. At Northville there is a federal fish hatchery. The Wayne County Home, a model institution of its kind, is located at Eloise.

The topography of the map was done by Messrs Robert Muldrow and J. T. McCoy, the control by Messrs George T. Hawkins and J. R. Ellis.

THE LARAMIE QUADRANGLE, WYOMING

It embraces about 900 square miles in Albany county. Laramie, which enjoys the distinction of being the county seat, is a thriving town, with a population of

8,200, situated on Laramie River and the main line of the Union Pacific Railroad. With an altitude of over 7,150 feet above sea level, it ranks as one of the highest towns in the United States. It is the seat of the University of Wyoming. The state fish hatchery and the agricultural experiment station are located there. It is also the shipping and trade center for a large area of country in which mining and stock raising are the chief industries. It has also rolling mills, plaster mills, limestone quarries, and railroad and machine shops.

Large numbers of cattle and sheep are pastured on the plains about Laramie and great quantities of hay are harvested along the Laramie and Little Laramie rivers. A number of gold and coal mines have been opened in the mountains just west of Laramie.

The topography is the work of Mr William Stranahan. The triangulation was done by Messrs Frank Tweedy and R. H. Chapman.

THE WOODSFIELD QUADRANGLE, OHIO

This is a rich agricultural section, but important as are crops of wheat, corn, oats, and potatoes, orchards of apples, peaches, and pears, herds of cattle, and forests of timber, they are not the chief treasures of this area. A 6-foot vein of Pittsburg coal underlies most of the quadrangle. Its development has only begun. Some of the richest oil and gas wells in the state are also near this area.

SOME NOTES ON THE FOX ISLAND PASSES, ALASKA

BY J. J. GILBERT, U. S. COAST AND GEODETIC SURVEY

OUR knowledge of the geography of the Aleutian Islands was very inexact until, in 1901, the Coast and Geodetic Survey sent two vessels to survey the Fox Island passes and eastward to the Sanak Islands. Westward of these passes and Unalaska Bay no surveys have yet been made, if we except one small harbor at Kiska Island.

The population of the Aleutian Islands, which spread over many degrees of longitude, is very meager, and is decreasing every year. A large number, estimated at about 30 per cent, died of measles in 1900, and tuberculosis of throat and lungs is very common.

The Aleuts, who strongly resemble the Japanese, live in a few small villages, widely separated. Some, and perhaps the greater number, of these villages are abandoned trading posts, established by the Russians previous to 1867, and the buildings originally constructed as warehouses and quarters for the agents and employés of the Fur Company are now occupied as homes by the few remaining natives. The only village of any size is Iliuliuk, on Unalaska Island, where the Alaska Commercial Company has maintained a post ever since the purchase. In the territory covered by the party surveying the passes there are but two other villages—one on Biorka Island and the other in Akutan Harbor; the population of both will hardly reach two score.

There are here and there evidences of old villages, indicating a considerable population in the past. These are cellar-like excavations from 10 to 15 feet square and 4 to 6 feet deep. As there is no timber growing on the islands, the lining and roofing of these dug-out huts must have been a serious undertaking, necessitating the gathering of driftwood from far and near. These old excavations are now covered with a rank growth of grass, and the unwary surveyor was liable to drop out of sight without warning.

The islands are mountainous, with a few narrow valleys, devoid of trees, mostly too rocky for any vegetation, but the smoother slopes are covered with long coarse grass. Each year the grass is matted down by the winter snows, the new grass grows up through the old straw, and the result is a springy mattress very tiresome to travel over.

When our party reached the passes on May 16 the mountains and hills were covered with snow, which in many places came down to the water's edge. It is the rare exception when the hills are not obscured by clouds, which often hang so low that only the beach line is visible. It is not probable that 1 per cent of those who go through the passes on their way to Nome, St Michael, or the Yukon have ever enjoyed an unobstructed view of the higher mountains and volcanoes, and often they have only seen the bases of the hills bordering the water.

During the early part of the season the clouds hung persistently low on the hills, greatly impeding the work of the survey, but as the season advanced and the snow melted the clouds were less persistent and hung higher and higher until during the last weeks of September, when the snow had disappeared from all but the very highest mountains, the clouds lifted, and the grand scenery of the passes was displayed unobscured during several successive days. While steaming into Beaver Inlet one of these clear days we enjoyed a rare sight—four active volcanoes, each emitting smoke. These were Shishaldin, 9,387 feet, from whose lofty funnel the smoke, black as if from recent stoking, streamed away many miles to leeward; Pogromnoi, also on Unimak Island, 6,500 feet; Akutan Peak, Akutan Island, 4,100 feet, and Makushin, Unalaska Island, 5,691 feet. One night earlier in the season, while anchored in Akun Bay, we saw the flames issuing from Shishaldin, 45 miles away, having the appearance of a burning smokestack.

On entering Akutan Pass from the south the first headland on Akutan Island is a conspicuous landmark, 1,600 feet high, which has some interesting features. To the members of the party this headland was known as "Liberty Cap," a name suggested by the crest, which resembles in outline the cap on the statue of liberty surmounting the dome of the Capitol. The suggestion of the Capitol is further strengthened by the formation at the base of the promontory, which presents a rounded face to the sea with several openings to the interior, one of them large enough to admit the steam launch; this is an arched gateway 20 feet across and about 12 feet high. Running through this passageway, some 30 feet long, with the launch we came into a large circular room which reminded us of the rotunda at the Capitol. This amphitheater is at least 100 feet in diameter, with an arched dome 100 feet high, having a large opening to the sky near the top, as though a part of the dome had been shaken down by an earthquake. There is good water, two fathoms or more, over the floor of this remarkable cavern. Besides the passage by which we entered, there are several others of varying widths, some leading by winding ways through to the open, others piercing deep into the base of the headland. It is the noise of the waves lashing into these narrow passages probably that gave origin to the name "Battery Point," by which this point is designated on the recent charts.

The tidal currents in the passes are very swift, sometimes as much as eight or ten knots, often causing "rips" of terrific violence. These tide rips are discernible a long distance by the white gleam of tumultuous waters, and it is sometimes possible to avoid them by running to one side, as they are usually, at least during the summer season, of limited extent, though following a somewhat erratic track.

Although alarming and even dangerous to a vessel in the midst of one of these rips, it is a grand sight when the water comes tumbling over the bows and sides, throwing the spray over bridge and tossing the ship about like a cockleshell.

It is hardly conceivable that a small launch or a whaleboat could live through one of these tide rips—even a small steamer would have a strenuous time of it.

The tide rips in Akutan and Unalga passes occur most frequently during spring tides, after the current has begun to run strong and when the wind is opposed to the current, but the opposing wind is not an essential element, as they sometimes occur during calm weather, when the sea is elsewhere perfectly smooth. It is safe to go through these passes at slack tide.

Aquatic birds, chiefly of one species, are abundant. Sometimes, more particularly in thick weather, we steamed through miles of them, and the noise as they rose from the sea, beating the water with their wings, was deafening. We had some of these birds prepared for the mess, but did not find them palatable.

Food fish of good quality are plentiful, but only in particular localities. We never failed of a good catch in English or Codfish bays.

Whales are frequently seen, sometimes in large schools. It was an interesting sight, one day, watching a dozen large whales feeding in a small bight at Egg Island, rolling over and over, evidently chasing a school of fish, which were frantically leaping from the shallow water along shore.

The impression upon the visitor to this region is one of grandeur, barrenness, and loneliness. There are no trees or bushes and rarely is there a glimpse of animal life other than aquatic. Once or twice we saw a ptarmigan or a fox; more often an eagle perched on a lofty crag added emphasis to the sense of loneliness and isolation.

A COMPARISON OF NORWAY AND SWEDEN

RECENT events in the Scandinavian Peninsula lend interest to statistics just compiled in the Bureau of Statistics of the Department of Commerce and Labor regarding the population, comparative resources, and industries of Sweden and Norway, as well as their commerce with the United States and other countries. Sweden and Norway have a combined area of 297,006 square miles, about equal to that of Texas and the Indian Territory. Their population is 7,484,301, practically the same as that of the state of New York. The area of Sweden is about 40 per cent more than that of Norway, the territorial extent of the two countries being 172,876 square miles and 124,130 square miles respectively.

Notwithstanding less favorable natural conditions, such as the poverty of the soil, about 75 per cent of which is unproductive, and a rigorous climate in the larger part of the country, also a relatively larger emigration, the population in Norway increases faster than in Sweden. Thus, the population of Sweden increased, between 1893 and 1903, from 4,824,150 to 5,221,291, or 8.2 per cent, while that of Norway grew from 2,032,-

100 to 2,288,535, or 12.6 per cent, during the same period. The total emigration from the two countries and the number of emigrants whose destination was the United States are shown in the following table:

Year.	From Sweden.		From Norway.	
	Total.	To United States.	Total.	To United States.
1893	40,869	37.321	18,778	*18.766
1894	13,358	9.529	5,642	5.591
1895	18,955	14,982	6,207	6.153
1896	19.551	14,874	6,679	6,584
1897	14,559	10,109	4,669	4.580
1898	13,663	8,534	4.859	4.805
1899	16,876	11,842	6,699	6,466
1900	20,661	16,209	10,931	10,625
1901	24,616	20,306	12,745	12,488
1902	37,107	33,151	20,343	19,225
1903	39.496	....	26.784	24,998
Total	259.711	176,857	124.336	120,311

*To America.

If the average population for the period 1893–1903—5,043,700 for Sweden and 2,165,600 for Norway—be compared with the corresponding average emigration figures—23,610 for Sweden and 11,303 for Norway—the rate of emigration appears higher for Norway than for Sweden, 5.2 per thousand as against 4.7 per thousand. During the decade 1893–1902 of the emigrants from Sweden who left their country over 80 per cent stated as their destination the United States, while of 124,336 Norwegians who left their native country, about 97 per cent, at the port of embarkation, indicated this country as their future home.

Of the total estimated population of Sweden in 1903, only 22.3 per cent appear under the head of urban dwellers, while of the total population of Norway, according to the 1900 census, 28.8 per cent are returned as living in urban settlements.

The difference in the industrial character of the population is shown, furthermore, by the fact that in Sweden the mainstay of the population is still agriculture, with its cognate branches, while in Norway the importance of agriculture is about the same as that of the fisheries, each of which industries, according to official estimates, furnishes an annual product of about 15 million dollars, or about 10 per cent of the annual national income. The average value of the principal cereal productions in Sweden for the years 1898–1902 is stated at $65,338,000, while the average value of Norwegian cereal crops for 1896–1900 was estimated at $9,640,000 only. This as well as the relative absence of minerals of industrial importance, involves a much greater dependence on the part of Norway upon imported breadstuffs and raw materials, and results, as a further consequence, in a tariff policy distinct from that of the sister nation. The imports of breadstuffs, including flour, during the calendar year 1903 into Sweden amounted in value to $16,331,000, and to $15,229,000 in Norway.

The only common industry of importance, especially for the foreign trade, is lumbering, inasmuch as both countries abound in forests, particularly spruce and pine, both of which varieties find ready sales in British and continental markets. Of the total domestic exports from the two countries, the exports of lumber and timber and manufactures thereof, such as wood pulp and matches, constituted 51.7 per cent in the case of Sweden and 40.4 per cent in the case of Norway.

The mining and the metal industry, which is an important source of national wealth in Sweden, giving employment to 30,731 persons in 1903, has but little importance in the national economy of Norway.

On the other hand, the earnings of the Norwegian merchant marine, especially of vessels engaged in the carrying trade between foreign ports, constitute a large portion of the national revenue and serve to offset in part the unfavorable trade balance. Norway's merchant marine is fourth in size among the merchant marines of the world, being exceeded only by those of the United Kingdom, the United States, and Germany. Its total tonnage is nearly one and a half million tons, as against 625,000 tons for Sweden. Its total earnings in 1902 were 29.7 million dollars, as against 13.4 millions earned by Swedish merchantmen, while the amounts earned by Norwegian vessels in carrying freight between foreign ports only was $22,375,000, as against $3,644,000 earned by Swedish vessels for similar services.

Sweden imports about 142 million dollars' worth of merchandise annually, about 6½ millions being from the United States, and Norway imports about 78½ million dollars' worth of merchandise, a little less than 5 millions being supplied by the United States. The exports from Sweden in the latest available year were 118¼ million dollars in value, about 3¼ millions having been taken by the United States, while from Norway the exports were 46½ million dollars in value, of which less than two millions were imported by the United States.

Our exports of domestic products to Sweden and Norway amounted to $11,325,383 in value during the fiscal year 1904, as against $10,071,565 during the preceding year. Less than twenty articles or groups of articles supply the bulk of the merchandise exported to Sweden and Norway from the United States. Arranged in the order of magnitude in 1904, the more important articles exported include the following: Refined mineral oil, $2,068,324; oleomargarine, $1,201,266; raw cotton, $1,155,708; iron and steel manufactures, $796,671; lard, $688,754; wheat flour, $565,755; copper and manufactures, $393.791.

Our imports from Sweden and Norway were valued at $5,258,114 in 1904, as against $4,975,234 in the preceding year. We are thus exporting to Sweden and Norway a little over twice as much as we import from those countries. Wood pulp forms a large portion of our imports from Sweden and Norway, the figures for 1904 being $1,202,455. Bar iron is next in order, $1,014,378; wire rods amounted to $559,914; machinery to $413,500, and hides and skins, except fur skins, to $309,518. Nearly all of the remaining imports were fishery products, amounting to about $1,000,000.

The following table presents statistics of the principal elements of national progress in Sweden and Norway respectively, the figures being those for 1903, or the latest available date:

Comparative statistics of Sweden and Norway for year 1903, or latest available year.

	Sweden.	Norway.
Area……square miles…	172,876	124.130
Population……number…	5.221,291	2,263.010
State revenue……dollars…	47,496,000	23,247 000
Railways……miles…	7,636	1,481
Merchant marine:		
Steam……registered tons…	356.510	603.625
Sail……do……	279.223	840,279
Vessels entered in foreign trade……tons…	8,857,826	3,250.724
Vessels cleared in foreign trade……do……	8.861.372	3.240,062
Imports……dollars…	141.979,000	78.472,000
Exports…… ……do……	118,291,000	46,531,000
Exports of domestic merchandise from United States to..dollars…	6,446,804	4,878.579
Imports into United States from……do……	3.265,843	1,992.271
Average ad valorem duty on total imports……per cent…	10.60	11.46
Public debt……dollars…	92.518,000	71,032,000
Annual interest charge……do……	3.248,000	2,301,000
Commercial and savings banks deposits……dollars…	379.163,000	160,678,000
Manufacturing establishments:		
Number of……	11.588	3.488
Number of employees……	271,157	81,813
Horse-power……	454.386	244.237
Value of output……dollars…	299.154,000	No data.
Gross freights earned by vessels engaged in foreign trade in 1902……dollars…	13,455,000	29,738.000

While no gold or silver bullion appears to have been sent to or received from Sweden and Norway, United States Consul Bergh, at Gottenborg, reports incoming money orders to the value of $2,500,000 sent from the United States to Sweden during 1904, and outgoing money orders to the value of $500,000 sent from Sweden to this country, a net movement of $2,000,000 to Sweden from the United States during a single year.

EUROPEAN POPULATIONS

IN the fifty years, 1850 to 1900, Russia shows the largest increase and France the smallest in the principal populations of Europe. The figures, in round millions, are:

	1850.	1900.	Increase.
Russia	67,000,000	129,000,000	62.000,000
Germany	26,000,000	56,000,000	30,000,000
Great Britain	27,000.000	41,000,000	14,000,000
Austria-Hungary	30,000.000	45,000,000	15.000,000
Italy	23,000,000	32,000,000	9.000,000
France	35,000,000	39,000,000	4,000,000

Two reasons account for the small French increase, namely, the loss of Alsace-Lorraine and the decreasing birth rate. The last is the most serious. In 1899 the excess of births over deaths in five of the countries named was:

Germany	795,107
Austria-Hungary	530,806
Great Britain	422,156
Italy	385,165
France	31,321

The following year, 1900, the French excess of births was only 20,330. It is a fact that 1,808,839 French families are without children. That is 16.68 per cent of all the families in France. It is also a fact that 2,638,752 French families, or 24.33 per cent, have only two children each.

In 1800 the population of Europe was 98,000,000, of which 26,000,000 were French; in 1900 the figures were 343,000,000 and 39,000,000. In other words, total Europe increased 245,000,000 in the century, but France can only be credited with 13,000,000 of that increase. Thus France fell from 26 per cent to 11 per cent of Europe's population in the one hundred years.

"At one time," says American Consul Haynes, of Rouen, France, "French was spoken all over the world; now (1905) it is the language of 45,000,000 people (including the French colonies), while German is spoken by 100,000,000 and English by 150,000.000."

In the fifty years, 1850 to 1900, the increase in the population of the United States was 53,000,000, or 14,000,000 more than the present population of France proper. It can be put another way: The population of the leading republic of the new world, which was 12,000,000 less in 1850 than that of the leading republic of the old world, is now more than double that of its chief republican competitor. Of course, the heavy American immigration largely accounts for this; but the American excess of births over deaths is, year after year, much larger proportionately than that of France.

Until 1850 France was in point of population the first of the great European nations; today she stands sixth, with Italy pressing hard to set her back to seventh and last place.

In Germany there are 600,000 more births each year than in France; that is why Count von Moltke said: "Every year by our birth rate we gain a battle over France."

Russia doubles her population each 50 years; Norway and Sweden, each 52; Great Britain and Germany, each 55; Belgium, each 79; Italy, each 84; Spain, each 104; Austria-Hungary, each 110, but France only each 183 years.

WALTER J. BALLARD.

Schenectady, New York.

JAPAN AND THE UNITED STATES

THE remarkable growth of Japanese foreign commerce during the first six months of this year, especially of imports from foreign countries, is shown in the June Monthly Return of the Foreign Trade of the Empire of Japan.

As compared with the six months' figures for the previous year, the imports show the remarkable increase of 56.9 per cent, from $90,952,000 to $142,659,000, while exports for the same period show a relatively insignifi-

From stereograph, copyright, 1905, by Underwood and Underwood, New York

Japanese Peasants Watching a Wrestling Contest cant growth of less than 4 per cent, from $68,458,000 to $71,098,000.

It is of interest to note that while the largest increases in imports are credited to the United States, the United Kingdom, and British India, the largest increases in exports occur under the head of China, United States, and Korea. Thus imports from the United States for the first six months of the year 1905 were $31,921,000, as against $13,328,000 during the same period of 1904; imports from the United Kingdom were $32,623,000, as against $16,982,000; imports from British India were $34,034,000, as against $21,092,000, while imports from Germany are stated as $10,794,000 for the first six months of this year, as against $6,985,000 for the same period of the year 1904. As regards imports from other countries, they have increased at a much lower rate, or else show decreases.

The exports during the same periods were largest for China, which is credited with $21,932,000, as compared with $14,953,000 during the first six months of 1904. The United States ranks next among the countries to which Japanese products are destined, the figures for the first six months of 1905 being $20,304,000, as against $19,910,000 for the previous year. In the third place now stands Korea, with $5,852,000, as against $3,840,000 for the same period of 1904. The exports to the other countries are relatively small and, moreover, show decreases. Thus exports to France, one of Japan's large customers of silk, have fallen from $7,117,000 during the first six months of 1904 to $5,401,000 during the first six months of 1905. The exports to the United Kingdom have likewise decreased from $4,343,000 to $3,335,000, while exports to Germany have fallen from $1,098,000 in 1904 to $1,045,000 in 1905.

The leading position of the United States in Japanese foreign commerce is seen from the fact that this country furnished 22.4 per cent of the total imports during the first six months of 1905, as compared with 14.7 per cent of the total imports during the same period of 1904, and is credited with 28.6 per cent of the total domestic exports during the first half year in 1905, as compared with 29.1 per cent of the total domestic exports of Japan for the first six months in 1904.

OUR IMMIGRATION IN 1905

FOR the first time in the history of our country the number of foreigners whom in twelve months we adopted as permanent citizens has exceeded one million. The official figures have just been published by the Bureau of Immigration and are given on the opposite page.

MAP OF THE PHILIPPINES

FOR the map of the Philippine Islands which was published as a supplement to the August number of this magazine we are indebted to the Bureau of the Census. The map was compiled under the special direction of Mr Henry Gannett, assistant director of the Philippine census, to illustrate the report on the Philippine census. Through the courtesy of Gen. A. W. Greely, U. S. A., chief signal officer, the government and civil telegraph lines were added to our edition of the map.

EXPORTS OF MANUFACTURES

EXPORTS of manufactures from the United States in the fiscal year 1905 were not only the largest on record, but are in excess of the combined exports of all articles in the centennial year, 1876, and nearly 140 million dollars more than the total imports and exports of the country at the close of the civil war.

Statistics just compiled by the Bureau of Statistics of the Department of Commerce and Labor show that the exports

Comparative statement showing the number of aliens (exclusive of aliens in transit) admitted to the United States, by countries, during the fiscal years ended June 30, 1904 and 1905, respectively, showing increase or decrease for each country.

Countries.	1905.	1904.	Increase.	Decrease.
Austria	111,990	177,156	98,537	
Hungary	163,703			
Belgium	5,302	3,976	1,326	
Denmark	8,970	8,525	445	
France, including Corsica	10,168	9,406	762	
German Empire	40,574	46,380		5,806
Greece	10,515	11,343		828
Italy, including Sicily and Sardinia	221,479	193,296	28,183	
Netherlands	4,954	4,916	38	
Norway	25,064	23,808	1,256	
Portugal, including Cape Verde and Azore Islands	5,028	6,715		1,687
Roumania	4,437	7,087		2,650
Russian Empire	167,928	145,141	39,756	
Finland	16,969			
Servia, Bulgaria, and Montenegro	2,043	1,325	718	
Spain, including Canary and Balearic Islands	2,600	3,996		1,396
Sweden	26,591	27,763		1,172
Switzerland	4,269	5,023		754
Turkey in Europe	4,542	4,344	198	
England	64,709	38,626	26,083	
Ireland	52,945	36,142	16,803	
Scotland	16,977	11,092	5,885	
Wales	2,503	1,730	773	
Europe, not specified	13	143		130
Total Europe	974,273	767,933	206,340	
China	2,166	4,309		2,143
Japan	10,331	14,264		3,933
India	190	261		71
Turkey in Asia	6,157	5,235	922	
Other Asia	5,081	2,117	2,964	
Total Asia	23,925	26.186		2,261
Africa	757	686	71	
Australia, Tasmania, and New Zealand	2,091	1,461	630	
Philippine Islands	39	52		13
Pacific Islands, not specified	36	42		6
British North America	2,168	2,837		669
British Honduras	123	109	14	
Other Central America	1,072	605	467	
Mexico	2,637	1,009	1,628	
South America	2,576	1,667	909	
West Indies	16,641	10,193	6,448	
All other countries	161	90	71	
Grand total	1,026,499	812,870	213,629	

of manufactures in the year just ended amounted to $543,620,297, as against $452,415,921 in the preceding year, $433,851,756 in 1900, and $183,595,743 in 1895. The growth in exports of manufactures far exceeds the growth of population or the growth in commerce as a whole. This is apparent from an examination of the following table, showing the population, commerce, and exports of manufactures of the United States in 1800, 1875, and 1905, and the percentage of increase in each since 1800 and 1875, the beginning of the greatest era in American development:

Year.	Population.	Commerce (imports and exports of merchandise).	Exports of domestic manufactures.
		Dollars.	*Dollars.*
1800	5,308,483	162,224,548	2,493,755
1876	45,137,000	1,001,125,861	100,492,055
1905	83,145,000	2,636,074,349	543,620,297
Per cent of increase:			
1800–1876	750	517	3,930
1876–1905	84	63	441

Iron and steel manufactures supply about one-fourth of the manufactured articles exported from the United States, the total in 1905 having been $134,727,921, as against $111,948,586 in the preceding year, an increase of nearly 23 million dollars. Steel rails showed an increase of 6 million dollars, chiefly in shipments to Canada, South America, Mexico, the West Indies, Japan, and other oriental countries, in several of which railway development is proceeding at a rapid rate. Machinery also showed an increase in 1905 of more than 6 million dollars over 1904. A conspicuous feature, however, is the large increase in exports of locomotives to Japan, 151 engines having been sent thither in 1905, as against 74 in the previous year. Mexico and Argentina increased their purchases of American sewing machines, while Japan increased her purchases of electrical machinery and builders' hardware, each in a substantial degree.

Copper manufactures, consisting largely of pigs and bars, form the item of second importance in our exports of manufactures, the total being $86,225,291 in 1905, as compared with $57,142,081 in the preceding year. This growth of practically 30 million dollars in a single year is accounted for by an increase of nearly 10 millions in exports to China, 3 millions to the United Kingdom, 1½ millions to France, 3 millions to Germany, 4½ millions to Netherlands, 1¼ millions to Russia, and nearly 2 millions to other countries.

Refined mineral oil ranks third in the exports of manufactures, the total being $71,888,317, as against $71,753,552 in the preceding year. Owing to the fall in price, the value remained practically stationary, despite the fact that the quantity increased from 847 million gallons in 1904 to 951 millions in 1905. The countries to which the largest exportations were made were United Kingdom, 221 million gallons; Germany, 142 millions; Netherlands, 117 millions; China, 90 millions; Belgium, 46 millions; British East Indies and Japan, each about 30 millions; Italy, nearly 29 millions, and France, 27⅗ millions. South America, as a whole, took about 55 million gallons.

Cotton manufactures present one of the striking features of the year's export record, having advanced from $22,403,713 in 1904 to $49,666,080 in the year just ended. The growth occurred chiefly in cotton-cloth exports, $14,696,199 being the total in 1904 and $41,320,542 the figure for 1905. To China there was an increase of about 400 million yards over last year's exportation of 76.9 millions, and the value of our cotton-cloth exports to that country increased from 4 million dollars in 1904 to 27¾ millions in 1905. Japan was the only other country to show a considerable increase in takings from us, the total being 16 million yards, valued at 1⅛ million dollars, as against less than 440,000 yards in 1904, valued at 55 thousand dollars.

Leather and manufactures of leather, fourth in importance in the list of manufactured articles exported, showed an increase of 4 million dollars, the total in 1905 having been 38 million dollars, as compared with 34 millions in the preceding year. In this class, also, Japan should be credited with the chief increase. To Japan we exported 16 million pounds of sole leather, valued at $4,146,428, as against 2 million pounds, with a valuation of about a half million dollars, in the preceding year. The increase in boots and shoes is principally in exports to the West Indies and Mexico, each of those countries being credited with about $400,000 in excess of the 1904 figures, while the total increase in boot and shoe exports to all countries was but little over $818,000.

Other important articles exported were: Agricultural implements, 20¾ million dollars; chemicals, drugs, dyes, etc., nearly 16 millions; wood manufactures, 12½ millions; cars, carriages, and vehicles, 10⅔ millions; scientific instruments, 8 millions; paper and manufactures of paper, 8¼ millions; paraffin and paraffin wax, 7¾ millions; fiber manufactures, 6¾ millions; tobacco manufactures, 5⅔ millions; books, maps, etc., nearly 5 millions, and india-rubber manufactures, 4¾ millions.

STATISTICS OF CITIES

THE Bureau of the Census has just issued a very useful report, Bulletin 20, presenting statistics of cities having a population of over 25,000. This bulletin contains comparatively few statistics relating to the population living in these cities, but is for the most part a compilation of data relative to the resources, transactions, plant, and machinery of the municipal corporations.

One finds in these tables such facts as the length (in miles) and the area (in square yards) of the paved streets classified with reference to kind of paving; miles of sewer; number of street lamps; miles of street railway track; number of school buildings and number of teachers and pupils; the number of public libraries with the number of volumes they contain; the number of almshouses and orphan asylums with the number of inmates; the number of policemen and the number of arrests they have made; the number of firemen and fire engines, the number of fires occurring during the year, and property loss from such fires; the number of marriages recorded in the office of the city or county clerk and likewise the number of divorces. There are also tables showing the total population of each city, and the deaths and death rates from each of the principal causes of death.

But by far the greater part of the tabular matter consists of financial statistics presenting the expenditures and receipts of each city classified by departments and offices, the public debt, sinking funds, etc. By reference to these tables one may readily compare the cost of government and of the several departments of government in different cities.

In the aggregate the financial transactions of the 175 cities included in this report equal in magnitude those of the national government. The total corporate receipts for these cities amounted to $541,624,203, while the revenues of the United States government in the fiscal year 1904, exclusive of postal revenues, were $540,631,749. The total corporate expenditures of the cities were $535,804,200; the expenditures of the United States government were $582,402,321. The national debt in 1904 amounted to $895,157,410; the aggregate debt of the 175 cities, exclusive of sinking fund assets, was $1,134,578,783. The receipts, expenditures, and debt for the city of New York represent about one-third of the city totals.

THE COMMERCIAL VALUATION OF RAILWAY OPERATING PROPERTY IN THE UNITED STATES

THE United States Bureau of the Census has just published Bulletin 21, presenting the results of an extended inquiry in regard to the commercial value of railway operating property in the United States. This inquiry was conducted by the Bureau of the Census, with the coöperation of the Interstate Commerce Commission,

STATE, TERRITORY, OR DISTRICT.	Commercial value of railway operating property as of June 30, 1904.	Per cent of total for United States.	Rank of state.	LATEST REPORTED VALUE AS ASSESSED FOR PURPOSES OF TAXATION.		Ratio of assessed to commercial value (per cent).
				Date.	Amount.	
United States	* $11,244,852,000	100.000	....	....	....	....
Alabama	150,211,000	1.336	24	1905	$53,926,020	35.9
Alaska	100,000	0.001	51	....	....	....
Arizona	68,356,000	0.608	44	1904	6,667,349	9.7
Arkansas	124,626,000	1.109	27	1904	34,709,023	27.8
California	350,694,000	3.119	8	1904	92,378,550	26.3
Colorado	198 261,000	1.764	19	Dec. 31, 1903	49,492,135	25.0
Connecticut	105,369,000	0.937	32	Sept. 30, 1904	120,493,648	114.4
Delaware	17,285,000	0.154	49	....	....	....
District of Columbia	5,578,000	0.049	50	June 30, 1904	2,486,024	44.6
Florida	80,467,000	0.716	37	1904	21,817,478	27.1
Georgia	156,603,000	1.392	22	1903	63,105,810	40.3
Idaho	91,877,000	0.817	34	1904	10,115,378	11.0
Illinois	805,057,000	7.159	3	1904	425,709,055	63.8
Indian Territory	79,405,000	0.706	40	....	....	....
Indiana	375,541,000	3.340	6	1904	165,863,367	44.2
Iowa	344,847,000	3.067	9	Jan. 1, 1904	57,535,160	16.7
Kansas	356,356,000	3.159	7	1904	60,093,534	16.9
Kentucky	155,772,000	1.385	23	1904	77,658,040	49.9
Louisiana	123,401,000	1.097	28	1904	29,044,195	28.9
Maine	80,146,000	0.713	38	....	....	....
Maryland	132,342,000	1.177	25	....	....	....
Massachusetts	250,052,000	2.224	15	....	....	....
Michigan	277,597,000	2.469	13	June 30, 1904	196,795,000	70.9
Minnesota	466,734,000	4.151	5	....	....	....
Mississippi	107 884,000	0.959	31	1902	29,847,640	27.7
Missouri	309,768,000	2.755	11	June 1, 1903	97,916,869	31.6
Montana	196,209,000	1.745	20	1904	36,759,827	18.7
Nebraska	263,170,000	2.340	14	1904	46,082,853	18.5
Nevada	43,745,000	0.389	46	1904	13,778,049	31.5
New Hampshire	79,786,000	0.709	39	1904	22,025,000	28.3
New Jersey	* 333,568,000	2.966	10	1904	231,655,525	69 5
New Mexico	86,400,000	0.768	36	1904	8,511,538	9.9
New York	* 898,222,000	7.988	2	1903	229,582,064	25.6
North Carolina	113,146,000	1.006	30	1904	69,480,974	61.4
North Dakota	123 390,000	1.097	29	1904	22,160,304	18.0
Ohio	689,797,000	6.134	4	1901	133,858,945	19.4
Oklahoma	78,668,000	0.700	41	1905	11,936,317	15.2
Oregon	75,661,000	0.673	42	....	....	....
Pennsylvania	1,420,608,000	12.633	1	....	....	....
Rhode Island	25,719,000	0.229	48	1904	15,832,003	61.6
South Carolina	75,500,000	0.671	43	1903	29,467,716	39.0
South Dakota	49,646,000	0.441	45	1904	14,354,930	28.9
Tennessee	131,166,000	1.167	26	1903	58,535,566	46.6
Texas	237,718,000	2.114	16	1904	95,209,785	40.0
Utah	90,325,000	0.803	35	1904	20,682,461	22.9
Vermont	37,311,000	0 332	47	Dec., 1902	27,344,020	73.3
Virginia	211,315,000	1.879	17	June 30, 1904	63,269,623	37.7
Washington	182,837,000	1.626	21	1904	26,066,949	14.3
West Virginia	201,799,000	1.795	18	1904	28,771,358	14.2
Wisconsin	284,510,000	2.530	12	1904	218,024,900	76.6
Wyoming	100,307,000	0.892	33	1904	7,498,232	7.5

* Exclusive of Jersey City ferries of the Pennsylvania Railroad system. The value of this ferry property is 5,698,000.

under the supervision of Prof. Henry C. Adams, statistician to that Commission. The first part of the bulletin, discussing the main results of the investigation, was written by Professor Adams. The second part, or "Supplement," consists of a series of papers by experts considering "Various Aspects of the Question of Railway Valuation."

The commercial value of railway operating property in the United States, computed for the year 1904, was $11,244,852,000. The apportionment of this value among the various states and territories of the Union (foreign possessions excluded) may be seen from the table on the preceding page.

The above valuation does not include the value of Pullman cars or private cars. The physical value of this equipment, that is to say, its value independent of the commercial use to which it is put, is estimated as follows:

Pullman cars	$51,000,000
Private cars	72,000,000

The total number of Pullman cars "available for the business of the company" on July 31, 1904, was as follows:

Standard cars with sleeping accommodations	2,903
Ordinary, or tourist, cars with sleeping accommodations	547
Parlor cars	464
Composite, dining, and other cars	85
Total	3,999

By commercial value is meant the market value. The two chief factors determining the market value of railway property are the expectation of income arising from the use of the property and the strategic significance of the property.

The value submitted was determined not with a view to discovering a proper purchase price for the railways of the United States, nor as a basis for taxing these railway properties, but as one step in ascertaining for the Census Bureau the total wealth of the United States.

Whether or not the value ($11,244,852,000) above submitted represents the value upon which the railways of the United States might properly be taxed depends upon whether the state undertakes to tax the roads at their full commercial value, including the values of both tangible and intangible property, or whether it seeks to confine its taxation to the value of the tangible property alone. In the former case the value submitted is believed to be substantially correct so far as it concerns the operating properties of the railways; in the latter case it is too high.

The results of the investigation reported in this bulletin have been carefully tested, and it is believed that the methods employed conform closely to those followed in the business world.

THE ZIEGLER POLAR EXPEDITION

THE loss of their ship, with most of their stores and equipment, almost at the beginning of their Arctic campaign, was mainly responsible for the modest achievements of the Ziegler Polar Expedition of 1903–1905. The party did not get farther north than 82° 13′, which is some degrees south of Abruzzi's record, but they did considerable surveying and conducted scientific observations of value. On the arrival of the expedition in Norway, Commander Fiala issued the following statement:

"Our rescue was most timely. By my order the *America* wintered in Teplitz Bay, where early in the winter of 1903–4 the ship was crushed in the ice and became a total loss, together with big quantities of coal and provisions.

"Supplies of stores left at Franz Josef Land by various relief parties saved us very serious privations. Three attempts to reach a high latitude failed. The scientific work, however, as planned, was successfully carried out by Mr Wm. J. Peters, of the United States Geological Survey.

"Our rescue was due to the splendid

efforts of Mr William S. Champ, secretary of the late William Ziegler, commanding the relief expedition, who, owing to the terrible weather, failed to reach us last year, and to the untiring zeal of Captain Kjeldsen and his Norwegian officers and crew, who for six weeks persistently forced their way through solid floes of ice and finally reached us.

"An abundance of stores had been left in the Franz Josef Archipelago by the expedition commanded by the Duke of Abruzzi and the André relief expedition, so that we did not suffer serious difficulties on that score."

In the spring of 1904 repeated attempts were made eastward and westward to force a passage to the Pole. The conditions, however, were insurmountable. The expedition found much open water, and day after day encountered fresh dangers and difficulties. Ultimately the supply of provisions ran short and a painful journey southward was begun, the members of the expedition finally reaching the depots at Cape Flora, Cape Dillon, and Camp Ziegler, among which they were distributed and where they managed to eke out the limited supplies by catches of walrus and bear.

The relations between the members of the expedition were most cordial and all took turns at duty, doing the hard work willingly.

Mr W. J. Peters, second in command, and who had charge of the scientific work, under the direction of the National Geographic Society, has cabled the following report to Dr Willis L. Moore, Chief of U. S. Weather Bureau and President of National Geographic Society: "No record. Conditions unfavorable. Considerable scientific work."

Mr Champ, leader of the relief expedition which sailed from Tromsö June 14 on the *Terra Nova*, deserves much credit for bringing back the party. The ice was unusually thick the past summer, and a less courageous man would have failed to get through.

On July 29 the *Terra Nova* reached Cape Dillon, and found six members of the Ziegler expedition safe and well. From this outpost sleds were dispatched to notify Mr Fiala at the headquarters camp of the arrival of the rescue ship.

The *Terra Nova* reached Cape Flora July 30, and found more members of the expedition. These had become weakened by the hardships they had endured, and some of them were so ill that they could not have held out for another winter.

Returning to Cape Dillon, Mr Champ organized a sled party and started for the headquarters camp, from which he brought back Mr Fiala and his comrades.

The *Terra Nova* sailed for home August 1. It got out of the ice pack August 6, and returned in excellent condition, arriving in Tromsö August 11.

THE HIGHEST DAM IN THE WORLD

THE U. S. Geological Survey announces that the town of Roosevelt, Arizona, humming as it is with the activities of its 3,000 inhabitants, is doomed. Its lease on life is only three years long. In 1908, when the engineers of the Reclamation Service shall have completed the highest dam in the world, Roosevelt will lie 172 feet below the surface of the water in the reclamation reservoir. Work has been in progress there for about a year, but men are laboring now, night and day, in three shifts of eight hours each, in order that no more than three additional years may be consumed in the task Then the town of Roosevelt will disappear, and in its stead 250,000 acres of now barren land near Phœnix will be reclaimed and give rich support to many more people than Roosevelt now contains. Lest the sweeping away of the 3,000 people should appear too severe, it should be explained that Roosevelt is in reality a camp; that practically all of its inhabitants are gathered to help along the gigantic Salt River Reclamation project, which will cost over $3,000,000. The engineering problems connected with the work are great. Before the dam could be commenced 80 miles of road had to be constructed. Most of the material has to be brought from Globe, the railway station, which is 40 miles away. The power canal, which is to be 19 miles long, is well under way. Its construction has involved the excavation of about 600,000 cubic yards of material and the driving of nearly 9,000 feet of tunnel. The canal will furnish power to generate electricity to operate all the works.

The government will make on the spot all the cement required, instead of purchasing it. It is expected that about 200,000 barrels of cement will be required in the construction of the Roosevelt dam, the power canal, and the various Tonto improvements. The cement used in the preliminary work cost $5.35 a barrel, delivered at the point where it was used. Bids were later received for furnishing cement at $4.81 a barrel. It will cost the government $1.60 a barrel to make the cement on the ground. If the cost of the plant, $120,000, be added to the cost of the 200,000 barrels of cement required, the total cost of the government cement will still be only $2.20 a barrel. This means a saving of $2.61 a barrel, or a saving of $522,000 on the entire work. After the dam and canals have been completed the cement plant will still be capable of further use, and considerable salvage may doubtless be realized. The cement mill is now in operation. The fuel used in burning cement in the kilns is crude petroleum from the California oil fields.

Map of Panama Canal.—In the October number THE NATIONAL GEOGRAPHIC MAGAZINE will publish as a supplement a map of the Panama Canal region, 24 by 33 inches and in five colors. The map was prepared by the Isthmian Canal Commission and is republished through the courtesy of Hon. Theodore P. Shonts, chairman of the commission.

IMPROVEMENTS IN THE REPUBLIC OF PANAMA

UNITED STATES Consul General Joseph W. J. Lee, Panama City, Panama, reports that the natural resources of the Republic of Panama are but little known to the world at large, the interest in the monumental project of a transisthmian canal overshadowing them. The work of the Panama government in opening the country and facilitating the exploitation of its resources by extended improvements in transportation and communication has not been advertised as fully as warranted by present accomplishment and expected results. Harbors, highways, and railways and a new city are among the projects to which President Amador has given his approval and upon which work is in progress. At present the central provinces of Los Santos, Cocle, and Veraguas are the fields for the greater part of these improvements, for which $1,050,000 (silver) have been appropriated.

The harbors of Pescaderias and Puerto Posada are to be improved, so that it will be possible for passengers and cargo to be received and landed at wharves. With the exception of Panama City, the port of Agua Dulce is at this time the only harbor on the Pacific where it is possible for vessels to discharge and load from piers.

The project is to construct first good roads and later railways, stretching across the plains and foothills, through the mountain passes, to the Atlantic, and thus develop rich natural resources which today lie dormant.

Gold mines long ago abandoned have

recently been relocated and are now worked with profit. The crude methods of the Spaniards were only successful where the mineral veins were most accessible. The results obtained by the use of modern facilities will surpass those of the original discoverers. Because of the lack of transportation facilities, coal and iron have lain undisturbed in the flanks of the hills. A large area of fine woods will become accessible when better communication is established. Cocoanuts, coffee, and rubber grow wild in luxuriance.

At the base of the hills rolling plains suitable for grazing large herds of cattle stretch for miles. Flourishing plantations and ranches covered this country until abandoned because of a series of disastrous revolutions. Now, secure of protection and peace and bettered by means of communication, the introduction of capital is certain to be followed by most satisfactory results.

The Panama government has appointed Vincent Peterson, an American engineer, to take charge of the development of the interior provinces. Mr Peterson has had much experience in mining, railway, and municipal engineering in the United States and Mexico. Last November he came to Panama as assistant engineer to the minister of public works. He has organized the engineering corps of the Republic and surveyed the boundary line between the Canal Zone and the country in the vicinity of Panama. No government undertaking has ever meant so much to the interior of this Republic, whose isolated dwellers are now about to profit by the rich advantages at their command.

The improvements to the harbor of Puerto Posada and the highway between that place and Penonomé are under way. Basket and rope making and the manufacture of genuine Panama hats are carried on in this vicinity. The port of Posada will serve as an outlet for the products of these industries. On the far side of Penonomé the highway will be continued through mountain passes and over the hills to the Atlantic.

From the port of Agua Dulce to the city of the same name the highway, with its necessary grades and bridges, is practically completed. This route will be further continued beyond Agua Dulce to the Santa Maria River. The river is to be spanned by an extensive steel bridge, the contract for which has been allotted to an American bridge company. Beyond the far side of the Santa Maria River the route divides, one branch leading to Chitré, capital of the province of Los Santos, and the other leading toward Santiago, capital of the province of Veraguas. Preliminary surveys of these routes are practically completed. Still another highway will connect Antom (or Pescaderias) with Agua Dulce, passing through Náta and Pócri and crossing the route which joins Puerto Posada and Penonomé, thereby opening the surrounding country to the influence of commerce and industry.

All these national roads are to be 50 feet wide, and the highways, as well as all bridges upon them, are to be built with a view to the practicability of paralleling them with narrow-gauge railways.

Midway between Agua Dulce and Penonomé a site for a model town has been planned. A public plaza, 460 feet square, is to be the center of the town, and around it will be grouped a church, school, government and municipal buildings, and a market. This town will be provided with a complete system of waterworks, electric lights, sewerage, and drainage. Plans for these works are open for competition. All the necessary preliminaries have been approved by the President of the Republic.

The Philippine Islands. Edited by Emma Helen Blair and James Alexander Robertson. Vol. XXIV, pp. 340; Vol. XXV, pp. 322. Cleveland, Ohio: Arthur H. Clark Co. 1905.

In these two volumes we have the conclusion of Medina's early Augustinian history and a survey of affairs generally in the Philippines for 1630–1636. It is, of course, all original material translated into English, the Spanish text not being given. There are enough notes to explain the most important points. With the present rise of Japan into world politics it is very significant to note the friction at that early period between the governments of these two archipelagoes. A considerable part of these pages deals with church quarrels, and Medina gives numerous biographies of ecclesiastics. Religious zeal is very apparent, just as in other Asiatic lands today, as there are constant calls for more missionaries. The volumes are up to the high level of the previous ones as to paper, print, and binding. C. M.

Antarctica. By Otto Nordenskjold and J. G. Anderson. With many illustrations and maps. Pp. 608. 6½ x 9 inches. New York: The Macmillan Co. 1905.

This is a perfunctory and uninteresting description of life in Antarctic regions. The expedition of which the book is a narrative followed beaten tracks and accomplished little that is new. Beyond the fact that some brave men incurred danger and passed a winter in a hut about 9 by 6 feet, there is really no reason for the existence of the book. The illustrations are lifeless and poorly printed.

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE PANAMA CANAL*

BY REAR ADMIRAL COLBY M. CHESTER, U. S. N.

SUPERINTENDENT U. S. NAVAL OBSERVATORY

IT is not the purpose of this address to go into the history of canal exploration or exploitation. There are a number of routes available for uniting the two oceans which wash the American Continent, and there is still a divergence of opinion as to which is the best locality for building the canal. Several routes have good points, and it has been only by a discussion of the pros and cons, weighted for their relative values, that a final conclusion has been reached as to which is the best. Many years ago this process eliminated all but two of the routes—Panama and Nicaragua—from serious consideration.

THE PROMINENT PART TAKEN BY THE U. S. NAVY

The work of solving the canal problem has fallen largely on the Navy of the United States. Company after company has been formed for the exploration of the different sections which it seemed desirable to examine, but in each and every case they came to the government for assistance, and their requests were referred to the Navy Department. Finally the government itself took up the matter and put it under naval control. The selection of the navy to perform this work was a wise and economic policy. Its officers are educated at a scientific school and drilled in surveying the coasts of the United States as well as in making surveys in all parts of the world covered by the voyages of naval vessels, as required by the following extract from the U. S. Naval Regulations, viz: "He" (the captain) "shall, when his duties and other circumstances permit, make a careful survey and construct a chart of any shoals, harbors, or dangers to navigation that he may discover or find inaccurately located." Such duties make the naval officer well fitted for the work of exploration. Not only was this an enforced duty on the navy, however, but willing hands were found who sought to carry the American flag into and across the inhospitable and almost impenetrable forests which abound in the tropical regions, where Nature herself has almost built a canal.

While many spasmodic efforts were made to cut the Gordian knot, about the middle of the 19th century it was seen that nothing but a systematic and scientific treatment of theproblem wouldavail, and one of the first to realize this was the late Rear Admiral Daniel Ammen, U.S.N. He had sought permission from the Navy Department to take charge of a party to explore the Isthmus of Panama early in the fifties, but was refused. Soon after this, civil war broke out in the country, and the navy had its hands too full to consider other than military matters. Hardly had the war ceased, however, before Ammen took up the problem and, enlisting the influence of his great friend, General Grant, he hammered away at it until the day of his death. Fortunately, Ammen was succeeded in that office of the Navy Department having charge of such matters by Rear Admiral John G. Walker, U.S.N. His earnest interest in the subject is demonstrated by the fact that he is now the Presidentof the Isthmian Canal Commission.* But today the canal project owes no man more for its promising future than it owes General Grant.

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*An address to the National Geographic Society, March 10, 1905.

Well-equipped expeditions were fitted out for surveying the different routes selected for examination by such men as Shufeldt, Lull, Selfridge, Crossman, Collins, Hatfield, all officers of the navy, and when the mass of evidence seemed to be pointing toward Panama as the most favorable site for a canal, a French naval officer came in suddenly and unexpectedly took the stake.

I say this with some fear of contradiction, yet I believe this contention can be maintained. To be sure, a number of the leading men in ourcountry favored the Nicaragua route, and many naval officers were strong in their conviction that its location was the most favorable for a canal, but I claim this view waslargely influenced by political considerations and the imperfect knowledge then extant regarding the work necessary to construct a canal on so large a scale.

One of the first official acts of the government of the United States in connection with canal investigation was a resolution passed by the United States Senate March 9, 1866, reading as follows:

"*Resolved*, That the Secretary of the Navy furnish, through a report of the Superintendent of the Naval Observatory, the summit levels and distances by survey of the various proposed lines for interoceanic canals and railroads between the waters of the Atlantic and the Pacific oceans, as, also, their relative merits as practicable lines for the construction of a ship canal, and especially as relates to Honduras, Tehuantepec, Nicaragua, Panama, and Atrato lines; and also whether, in the opinion of the Superintendent, the Isthmus of Darien has been satisfactorily explored; and, if so, furnish in detail charts, plans, lines of levels, and all information connected therewith, and upon what authority they are based."

The result of the resolution was a comprehensive report of the whole canal question as far as then known by the late Rear Admiral Charles H. Davis, U.S. Navy, Superintendent Naval Observatory, of which 8,000 copies were printed by order of Congress.

Another able and voluminous report on the "Problem of Interoceanic Communication by way of the American Isthmus" was prepared in pursuance of an order of the Navy Department by Lieut. John T. Sullivan, U. S. Navy, in 1883, which was published in accordance with authority of Congress, and which became a standard reference book on the subject.

THE PANAMA ROUTE

Capt. E. P. Lull, U. S. N., surveyed this route in 1875, and he estimated, as the most practical plan, for a lock-canal of a length of 41.7 miles from sea to sea; but the real origin of the Panama Canal as an accepted project may be found in the brief surveys of Lieutenants Wyse and Réclus of the French navy. On the

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* Since this address Admiral Walker has been succeeded by Hon. Theodore M. Shonts.

6th of October, 1876, Wyse had been authorized by a society called the "Societe Internationale du Canal Interoceanique" to proceed to Central America for the purpose of exploration. His examinations were begun on the Pacific coast about the middle of December, 1876, and terminated in the first part of April, 1877, a period of not more than four months, during which time no part of the expedition penetrated as far as the Atlantic coast. The party, under the charge of Lieutenant Réclus, spent from April 3 to April 20, 1878, making a survey of the valleys of the Obispo, Chagres, and Rio Grande, along the line of the Panama railroad, the level-lines and cross-sections being run up only to the extremities of the then proposed tunnel, and not continuing over the divide.

Armed with this incomplete record concerning the Panama route, but with a concession for building a canal which embraced the whole country of the United States of Colombia, thus including all the proposed routes except Nicaragua and Tehuantepec, Wyse reported to his company in Paris.

On the 15th of May, 1879, an international conference was held at Paris under the auspices of the Paris Geographical Society. The conference was composed of 136 members, of whom 74 were of other nationalities. The conference, which was controlled by the great engineer Count Ferdinand de Lesseps, who had just built the Suez Canal, after mature consideration, but consideration wherein political elements largely predominated, finally concluded as follows: "The conference deem the construction of an interoceanic canal so desirable, in the interest of commerce and navigation, as possible; and in order to have the indispensable facilities of ease of access and use, which a work of this kind should offer before all others, it should be built from the Gulf of Limon to the Bay of Panama." Thus the Panama railroad was a prime factor in inducing the Paris conference to select the Panama Isthmus as the location for a canal. The company which built the railroad held a concession from the Colombian government dated June 28, 1848. The concession, in a slightly different form, had lapsed from a French company which had been unable to control the capital stock, and the grant was revived in favor of Henry Aspinwall, John Lloyd Stevens, Henry Chauncey, and their associates under the name of the Panama Railroad Company, an organization which later, in 1849, was incorporated by the legislature of the state of New York. Under this grant the company constructed the road, and on the 27th of January, 1855, it was completed and the first passenger train passed over the track.

DE LESSEPS' COMPANY

A company, of which de Lesseps became president, was soon formed for the construction a tide-level canal, and because of the prestige of its chief it was an easy matter to obtain subscriptions to its stock. Unfortunately, among the stockholders there was a large element of the poorer classes in France, who believed that de Lesseps would make a fortune for them out of their small holdings, and many of them sacrificed their little all in the scheme. The capital stock of the company of 300,000,000 francs ($60,000,000) was soon half taken up and work began on the construction of the canal. Wyse expected to be named as director general of the canal, but failing to secure what he considered his rights, a coolness sprang up between him and the president of the company which was anything but favorable to the work. Finally, in 1881, M. Réclus initiated the enterprise and began clearing the ground, assembling the plant, and constructing buildings, hospitals, etc. But troubles grew more rapidly than did the canal. No well-developed plans had been prepared, and in fact hardly any one knew what was required. Directors and engineers of the construction company changed so rapidly that it became a common saying on the Isthmus that "it was worth a man's yearly salary to simply come there, and he was a very poor engineer who could not make a fortune in six months and go away."

In October, 1885, four and one-half years after ground was broken, the state of affairs on the Isthmus was given by one good authority as follows: "There have been moved a total of from 16,000,000 to 17,00,000 cubic meters of earth, 12,000,000 only being from the canal proper, and 88,000,000 are still to be excavated; besides there have been prepared buildings and stables on an extravagant scale, farms and gardens at great expense around headquarters, railroad branches, field hospitals, and roads, three of which are of but little use except for pleasure riding of employés."

It was about this time (1885) that, after several years' absence, it was again my privilege, as commander of the U. S. ship *Galena*, to return to the Isthmus of Panama and become an enforced but interested spectator of the construction work on the canal, and my recollection of the state of affairs accords with that above given. In fact, an eye-witness could foresee even at this early date that the extravagance which prevailed must lead to the failure of the company. For the next three years, while the progress of the first Panama Canal Company's work was at its height, I spent portions of each winter at Colon and watched with increasing interest the operations of the great undertaking. From that time to the present I have never lost faith in the final success of the Panama Canal.

In the meantime a rival company was organized to construct the Nicaragua Canal, and having for a number of years been interested in surveying and having had an extensive association with the officers who had been making explorations in Central America, I was asked to associate myself with others in support of the Nicaragua Company. To all such suggestions I made answer that I was a Panama Canal man first, last, and all the time, and that I believed when the financial elements of the opposing canals were finally settled by bringing up the then estimated cost for constructing the Nicaragua Canal, which was placed at about $45,000,000, to a reasonable basis of not less than $100,000,000, and the French company should fail and sell out its assets for a song, as then seemed to me more than likely, that some new Panama Canal Company could and would build a better canal for an amount, including the purchase price of the defunct company's holdings, less than the cost of a poorer canal at Nicaragua. I have been so strong in this conviction that two years before the Isthmian Canal Commission made its report in favor of purchasing the interests of the reconstructed Panama Canal Company for $40,000,000, I offered to wager that such a finding would be the result of their deliberations.

I must say that my feelings in this matter were not altogether freed from a little bias, owing to the fact that while our own officers had done the principal work of exploration of the canal zones, and when, as it seemed to me, the sentiment of the country was crystallizing in favor of building a canal across the Panama Isthmus, a French naval officer with but little actual exploration to his credit should, by the use of the great name of de Lesseps, come in and steal a march on us.

While on the Isthmus during the latter part of 1887, I ventured to ask Mr Charles de Lesseps, who was then the company's manager, if he really expected, as was then widely published, that the canal would be completed the following year. He replied that, while he would not like to have it known, he did not mind telling me that, in order to complete it at that time, as well as to procure revenue for continuing the digging down to the sea level, the company might be forced to the lock system of construction. This would surely be accomplished in the end. Before the time limit was up the entire plans of the canal had been changed to the lock system, but as the money was then practically all gone and no more could be obtained, the company was forced into bankruptcy. This took place in February, 1889, but a short time after I left the Isthmus.

THE EARLY PLANS

The plan that was first adopted by the old Panama Canal Company, was for a sea-level canal having a depth of 29.5 feet, and bottom width of 72 feet, with a total length of about 47 miles. Naturally, the estimates for constructional work on the canal at this time were very crude, being based on insufficient data regarding the physical conditions of the country as well as on insufficient surveys. As at first planned, the canal passes through low ground from Colon on the north, by a direct line for a distance of 6 miles to Gatun, where it intersects the valley of the Chagres River, passes up that valley a distance of 21 miles to Obispo, where it follows the valley of a small tributary, cuts through the continental divide at Culebra, and thence descends by the valley of the Rio Grande to the Bay of Panama.

As it was necessary to provide easy curves everywhere in the canal, a point was selected for crossing the divide somewhat higher than that of the lowest pass. The maximum height on the center line in the Culebra Cut was 333 feet above the sea. The greatest problem the company had to solve was the control of the floods of the Chagres, which at times rose to enormous proportions. Various schemes were proposed to meet this difficulty, the most prominent being the construction of a dam at Gamboa to impound the waters of the upper river, and the excavation of two independent channels, one on either side of the main canal, to carry off the surplus waters to the sea.

The cost of the canal as estimated by de Lesseps in 1880 was $127,600,000, and the time required for its completion was 8 years.

As has been stated, in 1887 his company was forced to admit that it was impractical to build a sea-level canal in the time and with the money available, and a tentative scheme for opening the canal in order to precure revenue was adopted which contemplated the use of locks. This being a temporary expedient, the summit level was to be supplied with water from the Chagres River by pumps; but, with the funds exhausted, even this became a hopeless task, the company was forced into bankruptcy, and in May, 1889, work on the canal ceased altogether.

DISAPPEARANCE OF THE SECURITIES

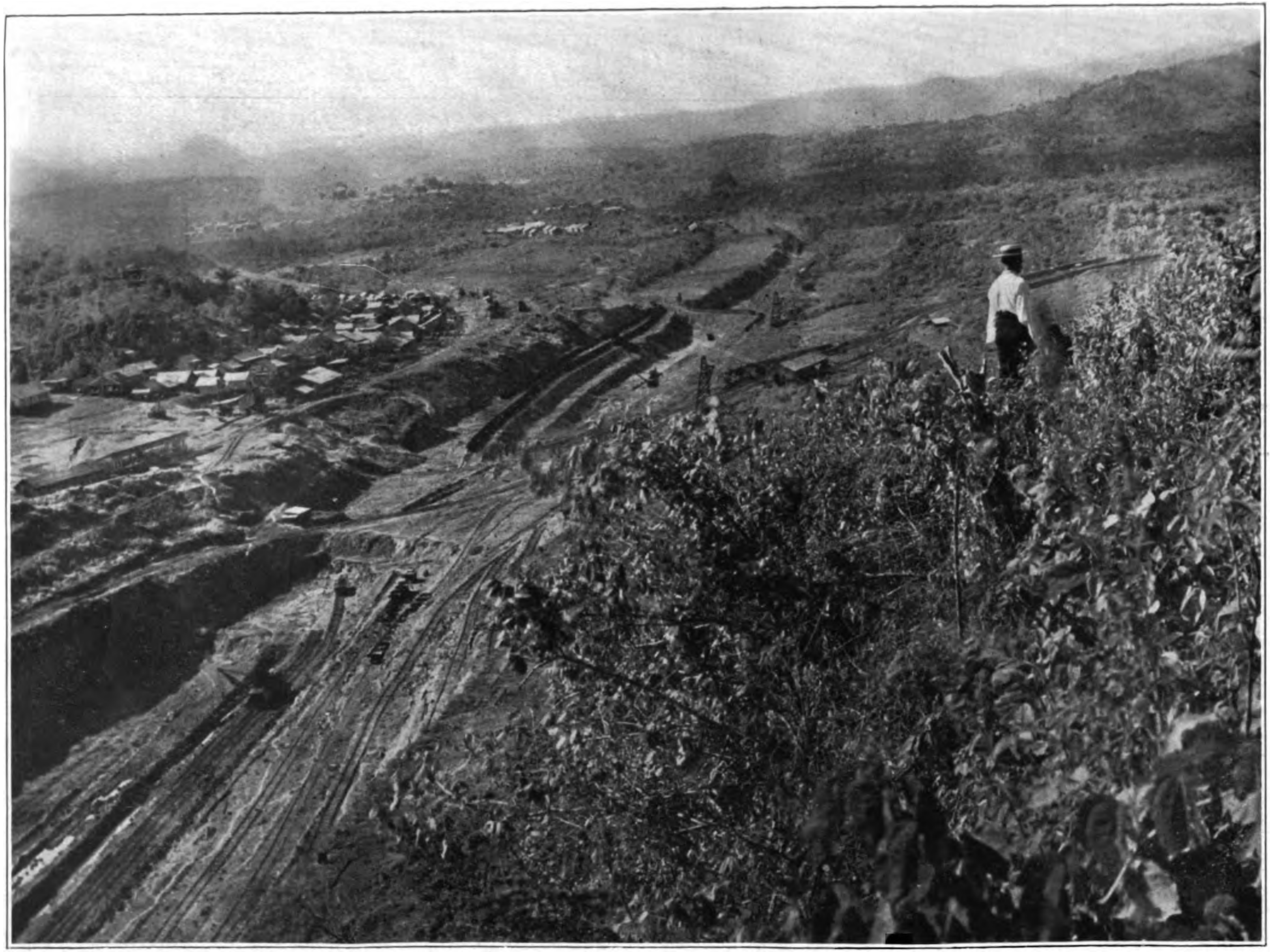
After much difficulty in arranging the concessions, a new company was organized on the 20th of October, 1894, with a capital stock of 650,000 shares of 100 francs each. Thus, after deducting 50,000 shares given as full-paid stock to the Colombian government, in compliance with the terms of the extension of the concession, the cash capital of the company was only 60,000,000 francs, or $11,640,000, a sum which allowed only for some provisional operations then contemplated. It is hardly necessary to go into the scandals connected with the failure of the old company, as they do not affect the problem. The old company and the liquidator had raised by the sale of stock and bonds the sum of $246,706,431.68, while the securities issued to raise this sum had a face value of $435,559,332.80. The number of persons holding them is estimated at over 200,000. There had been purchased and transported to the Isthmus an enormous quantity of machinery and other plant at an estimated cost of $29,000,000. It is said that the terre-plein of Christobal Colon, on which the superintendent's residence was built, was constructed almost entirely of discarded material from this purchase. In fact, I saw a great amount of material so disposed of myself.

It should be noted that the Panama Railroad, which ran over practically the same route as did the canal, was of great importance to the canal company in constructing the canal, not only on account of its facilities for handling supplies, but because the railroad company's concession covered any system of transportation which might be adopted along its line. This made it necessary, in order to control the road, for the canal company to purchase most of its stock, which alone took out nearly $19,000,000 worth of assets.

FEARFUL LOSS OF LIFE

It should also be noted that the sanitary question was not only an important, but a very expensive, item to the company. There was ample provision for caring for the sick, with large and expensive hospitals under control of the company, but little or no attention was paid to precautionary measures, which now are considered such important factors in sanitary science. Those of us who visited Colon in the height of the boom may recall the ghastly scenes which met our eyes. One might witness on almost any morning a scavenger's wagon going about the town gathering up the bodies of those who had succumbed during the night in the hovels of the place or in the streets to the prevailing disease which fed on the filth of the land. The celebrated suburb of Colon, "Monkey Hill," was the receptacle for these corpses, which received in transportation and burial less consideration than would usually be given to a dead dog.

The plan adopted by the new Panama Canal Company, as stated in the Isthmian Commission's report, involved two levels above the sea level; one of them, an artificial lake to be created by a dam at Bohio, to be reached from the Atlantic side by a flight of two locks, and the other, the summit level, to be reached by a flight of two locks from the preceding, the summit level to have its bottom 68 feet above the sea and to be supplied with water from a feeder leading from an artificial reservoir to be constructed at Alhajuela in the upper Chagres Valley; the ascent on the Pacific side to be likewise of four locks, of which the two middle ones are combined in flight; the canal to have a depth of 29.5 feet, and a bottom width of about 98 feet, with an increased width in certain specified parts. Its general location was that adopted by the old company. The cost was estimated at $101,850,000 for the work, which did not include administration or financing; this matter of financing was estimated at nearly $100,000,000. While this was the plan recommended by the French engineers, they worked out in detail a second plan, which is an extension or modification of the foregoing, which they seemed to prefer in itself, but which they feared would require more time to execute. Under the second plan the upper level was omitted, the cut through the continental divide being deepened until its bottom was 32 feet above the sea; Lake Bohio was made the summit level and was fed directly by the Chagres; one flight of locks on the Atlantic side and one on the Pacific was omitted; the feeder from Alhajuela was omitted, but the dam at that place was retained. The estimated cost of completing this plan was not much greater than that for the other, being about $105,500,000. In both plans the dam at Bohio converted the river between that point and Obispo into a lake of such dimensions as not to be seriously affected by the partial floods admitted to it, while diversion channels



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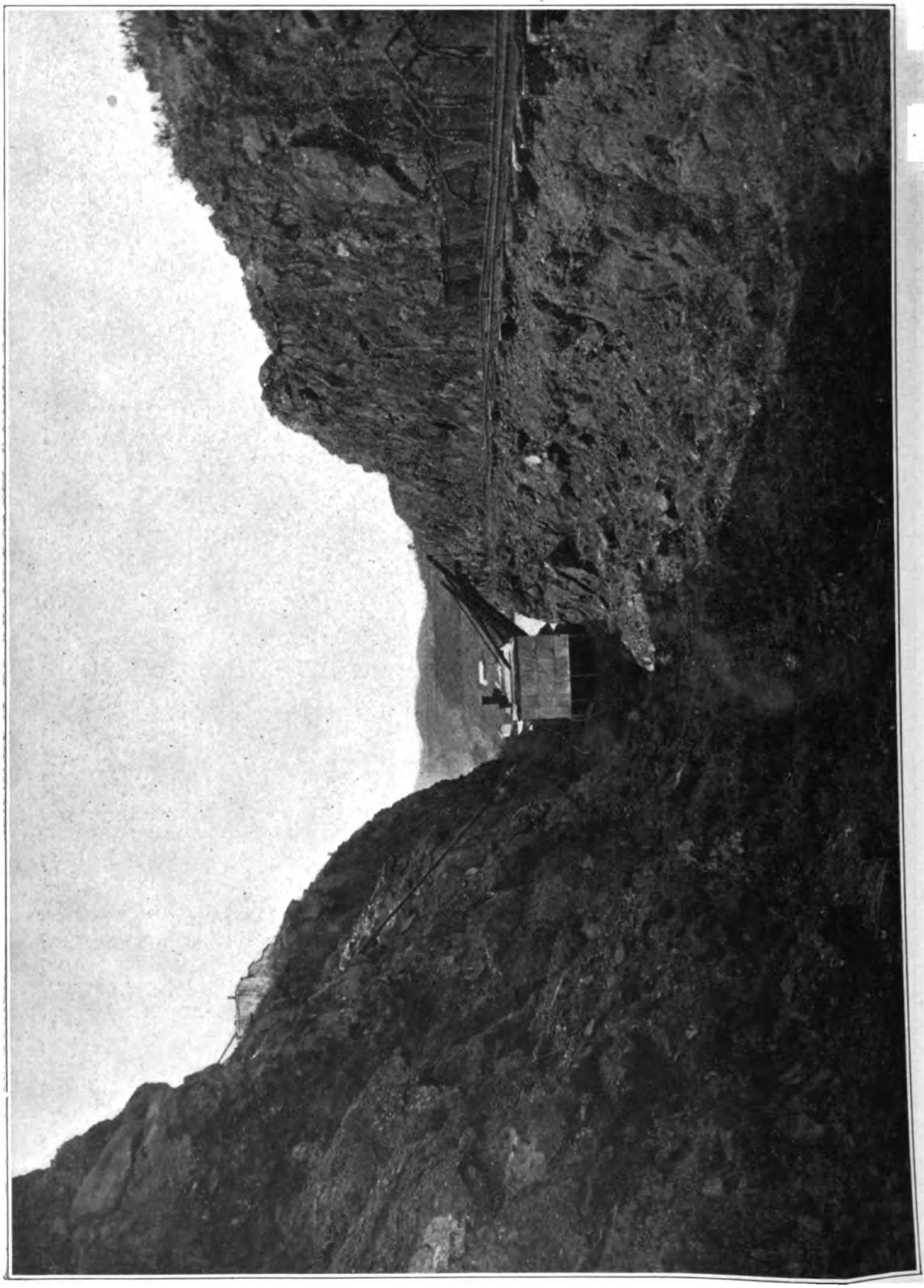
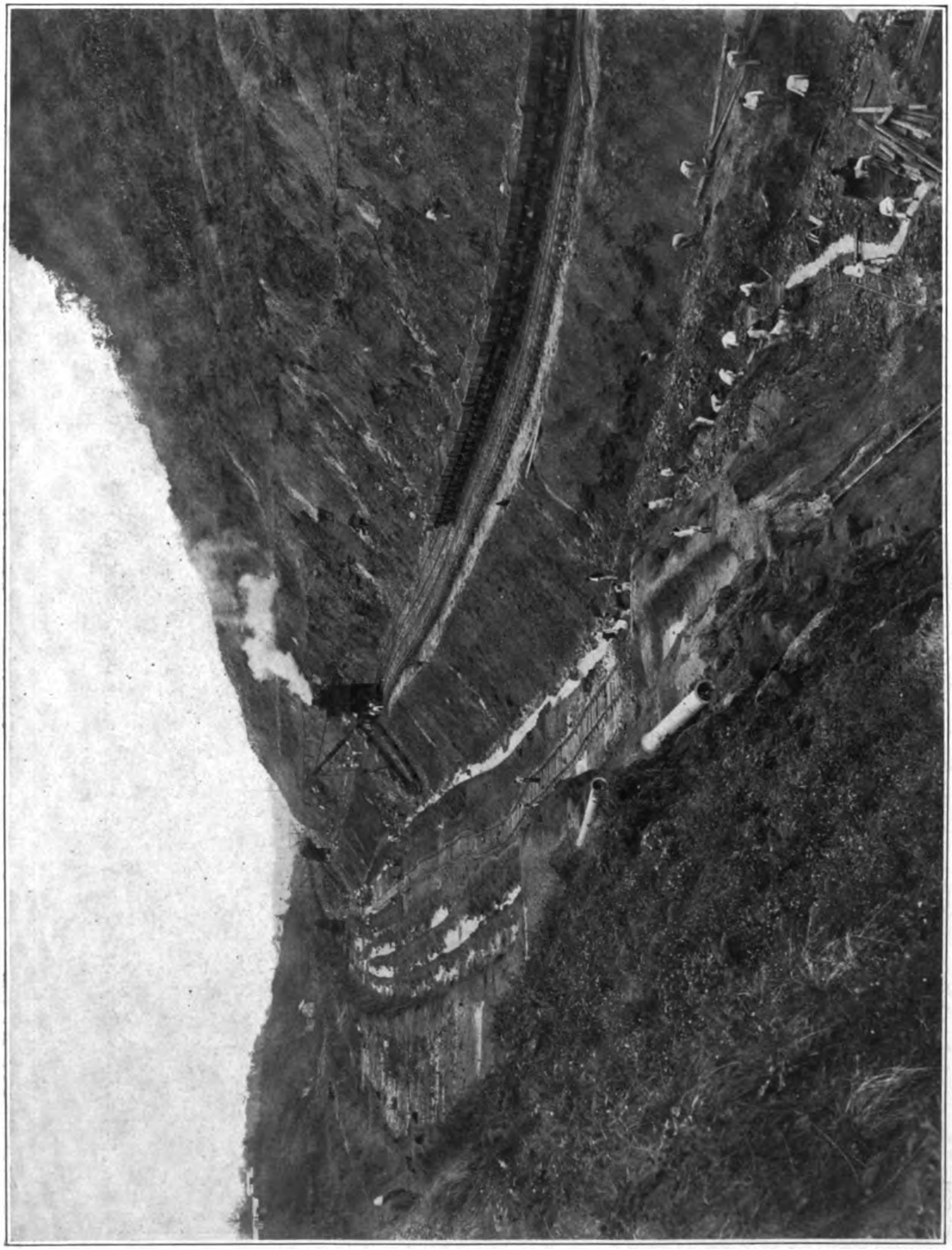
Unfinished Cuts in the World's Greatest Canal

From top of Culebra, looking northwest, toward the Atlantic Ocean



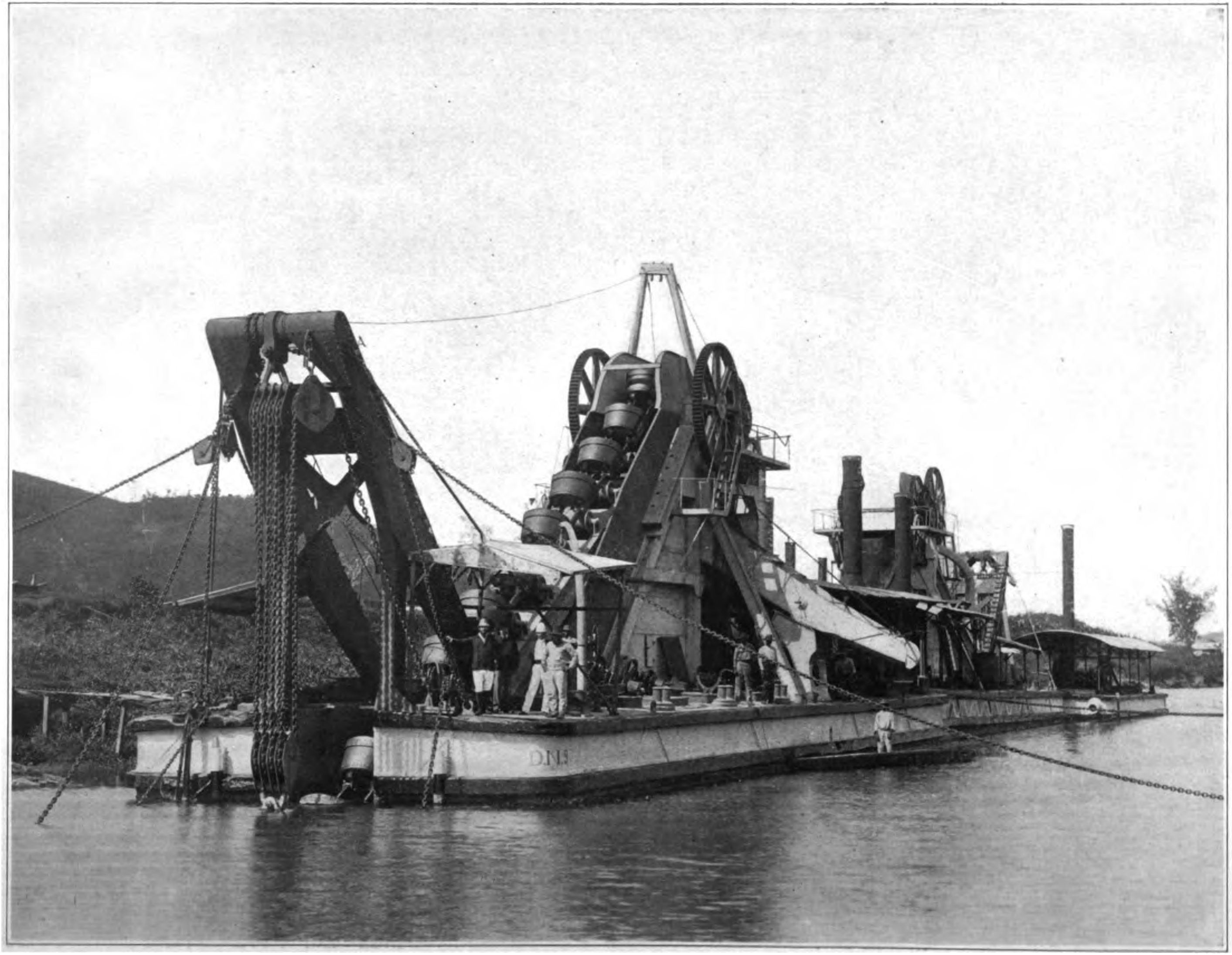
From W. P. Tisdel

Rock Cut at Bas Obispo



From W. P. Tisdel

The Culebra Cut, Looking North



From W. P. Tisdel

Dredge at Gorgona

were to be constructed on both sides of the canal from this lake to the sea. With a carefully designed system of sluices and controlling works, the violence of the floods was to be checked by impounding the water both above the Alhajuela dam and Lake Bohio, so as to keep the flow below the Bohio dam within the capacity of the two diversion channels. It will be seen that in brief this second plan of the new company simply does away with the upper level at Culebra and leaves but one continuous stretch on the level of about 32 feet above the sea from Bohio to Miraflores, a distance of 22 miles.

THE PLAN RECOMMENDED BY THE FIRST ISTHMIAN CANAL COMMISSION

The plan prepared by the first Isthmian Canal Commission,* which was made before the transfer of the property to the United States government took place, seems to follow this general plan very closely, except that it raises this section to an elevation of about 90 feet above the mean sea level. This plan was only tentative and depended upon further investigation, which is now being carried on. There can be no question but that for such a stupendous scheme this investigation cannot be too exhaustive, and time used in it will save many months in the final completion of the canal. The Commission is, however, going ahead with such work as must be done in any scheme that may be adopted.

The canal as thus projected may be described as follows: Beginning at the 6-fathom curve in Limon Bay, a channel 500 feet wide at bottom is excavated, curving to the left until it reaches a point just inside the jetty constructed by the old Panama Canal Company. Here it changes direction to the right and is then conducted in a straight line to a point about 2½ miles from deep water in the bay. For about a mile this wide channel is inside the low shore line, forming a narrow but well-protected harbor. Near the apex of this second curve the bottom width is increased to 800 feet for a length of 800 feet to provide a turning basin. From the inner end of the harbor the bottom width of the canal is 150 feet and the level of the water is maintained at sea level for a distance of about 14½ miles to the Bohio locks. This sea-level section is cut through low land or swamps until it reaches Gatun, 6 miles from the initial point, where the first high land is met. In fact a cross-section of the canal prism here is so high as to make it possible to construct the first locks—a contingency which is still an open question.

At Bohio is located a double flight of locks, having a total lift varying from 82 feet at the minimum level of the lake to 90 feet at the maximum, 41 to 45 to each lock, the normal lift being 85 feet.

ARTIFICIALLY CONSTRUCTED LAKE BOHIO

While there is some question about the feasibility of locating locks at Gatun, the Commission was of the opinion that no location suitable for a dam existed in the Chagres River below Bohio, and, while this location is not without difficulties, it has the great advantage that about 3 miles southwest of the dam, near the head of the Rio Gigante, the tributary of the Chagres, there exists an excellent site for a spillway, by which the discharge from the lake can be kept away from the dam and accessory works, even when extremely large, without inconvenience to the canal itself or to the country below the lake. The height of this spillway would regulate the height and area of the lake. After careful consideration of the requirements for flood control and for storage against deficiency in the dry season, and also of the effect upon the amount of excavation required for the canal through the continental divide, the Commission decided to fix this height at 85 feet above mean tide, and to make the spillway a fixed weir 2,000 feet long. The area of the lake at this height is 38.5 square miles.

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* See map of the Panama Canal region published as a supplement to this number.

Above the Bohio locks the canal enters the artificial lake formed by the dam and known as Lake Bohio. For the first 7 miles it will become a broad, deep body of water, affording room for anchorage as well as navigation. The length of the channel in Lake Bohio is about 12½ miles from the locks to the point where the canal leaves the Chagres River or 13½ miles to the point where it enters the cut through the mountain divide which separates the Atlantic and the Pacific slopes.

Near the entrance to the summit cut at Obispo will be placed a pair of gates 100 feet wide, so that if it should be necessary to draw off the water from the summit cut the level of Lake Bohio would not be affected by it.

It should be noted that the Commission's plan to increase the height of Lake Bohio from 32 to 90 feet gives it the increased area by distributing the impounded waters over a large section which would not be covered by the lower level. The higher level also allows a great saving in the excavation of the canal prism in this section, and should it be used will probably reduce the total amount of cost for excavation. At all events, as it will not take much longer to raise the vessels the additional height in the locks, but will allow for a greater speed in the lake, the time of their passage through the canal must be shortened.

The summit of "Culebra Cut," as it is called, is nearly 8 miles long from the Obispo gates to the Pedro Miguel locks. The highest point of the divide is about 5 miles from the Obispo gates, where the canal axis is 286 feet below the natural surface of the ground.

The Pedro Miguel locks, the beginning of the next section of the canal, will be similar to the Bohio locks, the aggregate lift varying from 54 to 62 feet. The level of this section is therefore about 28 feet above the sea, and it extends for a distance of 1.33 miles to the last lock, which is at Miraflores.

The Miraflores lock has a lift varying from 18 feet at high tide to 38 feet at mean low tide.

For a little over 4 miles beyond the Miraflores lock the canal extends through a low, swampy country through which the Rio Grande flows. This brings the canal to a point known as La Boca, where the Panama Railroad Company has constructed a large and substantial wharf. A dredged channel 200 feet wide will extend from this point for about 4½ miles to the 6-fathom line in Panama Bay.

COLON HARBOR

One of the most important questions in the canal problem, which heretofore has received practically no attention from any of the companies which have had to deal with the canal, is the construction of a harbor at its northern entrance. A committee has recently reported to the Commission a solution for this problem which contemplates the construction of a breakwater at Colon at a cost of $6,500,000. Indeed, this decision has come none too soon, for already material for the construction of the canal is arriving at Colon, which must be the main depot for the reception of canal supplies, and the difficulties for transshipment are great. There is a small harbor which has been made by widening the canal prism at Christobal Colon, but it is too small and too dangerous of approach for vessels of any size in stormy weather, and as Limon Bay is at the present time an open roadstead, almost any weather may be considered stormy there.

THE TERRIBLE NORTHERS AT COLON

Naval officers who have had for the past half century to police the Isthmus of

Panama and protect its transit have had many disagreeable experiences while anchored in the harbor of Colon or Aspinwall, as it used to be known. One event in my own service there I can hardly recall even at the present day without a shudder. It was in the winter of 1886 when we reached this port with some of the *Galena's* machinery needing repairs. After coaling from a Norwegian barque, which was lashed alongside the ship with much difficulty, owing to the heavy sea, we began to take the machinery apart. Realizing, however, that if caught by a "norther," which might come up at any time—without power to move the ship out of the harbor—disaster was likely to follow, I decided to proceed to the little closed harbor of Porto Bello, which lay about 30 miles to the eastward of Colon, and there make the necessary repairs. At the end of two days, when about to return to Colon, word was received through the commanding officer of a French corvette that during our absence a heavy norther had occurred at Colon, and that the French ship had escaped from the harbor almost by a miracle. As that vessel was a much higher powered steamer than the *Galena*, I cannot bear to think of what might have occurred had we remained in this treacherous harbor. Returning to Colon as soon as possible, the sight that met our gaze I shall never forget. Nineteen vessels had been totally destroyed by the terrific storm, and wreckage and dead bodies strewed the beach for miles around. The barque from which we had taken coal was driven ashore at Christobal Colon, near which we had been anchored, and there was not a vestige of her in sight. A similar fate would surely have been the *Galena's* had she remained in the harbor with her motive power inoperative. Over 50 lives were lost in this storm and the destruction of property was enormous. No doubt this loss of property took a large share of the money which was unaccounted for belonging to the canal company.*

THE PROBLEM OF SANITATION

Few persons who have not visited the Isthmus can have any conception of the magnitude of this problem, and only those who witnessed the great waste of life and money from the want of proper sanitary measures during the closing months of the old Panama Canal Company's existence can form a proper estimate of the value of good sanitary conditions in this trying country.

It should be remembered that practically all of the labor used in the canal section must be imported. At first, under the influence of de Lesseps' great name, large numbers flocked to the Isthmus from Jamaica, which island is said to furnish a class of labor second to none for tropical work. Impetus was given to this emigration of the islanders by the fact that the trade in sugar, which was then the staple article of production in Jamaica, was ruined by the bounty paid for the cultivation of this important commodity in our own southern states, and the great fruit business which now gives the island considerable revenue was then in its infancy. It was therefore not a difficult matter for the company to make contracts with the idlers to go the short distance to the Isthmus, where good prices for labor prevailed. But when, after a comparatively short time, a few decrepit negroes returned to their homes in an endeavor to eradicate from their systems the effects of diseases, with reports that the thousands who did not return had gone to their last resting places, a reaction set in and the Jamaica market became less available. Further, the British government, seeing their beautiful island overrun by paupers who had returned from the Isthmus without the power of earning the food for their depleted bodies, finally put a stop to this emigration altogether.

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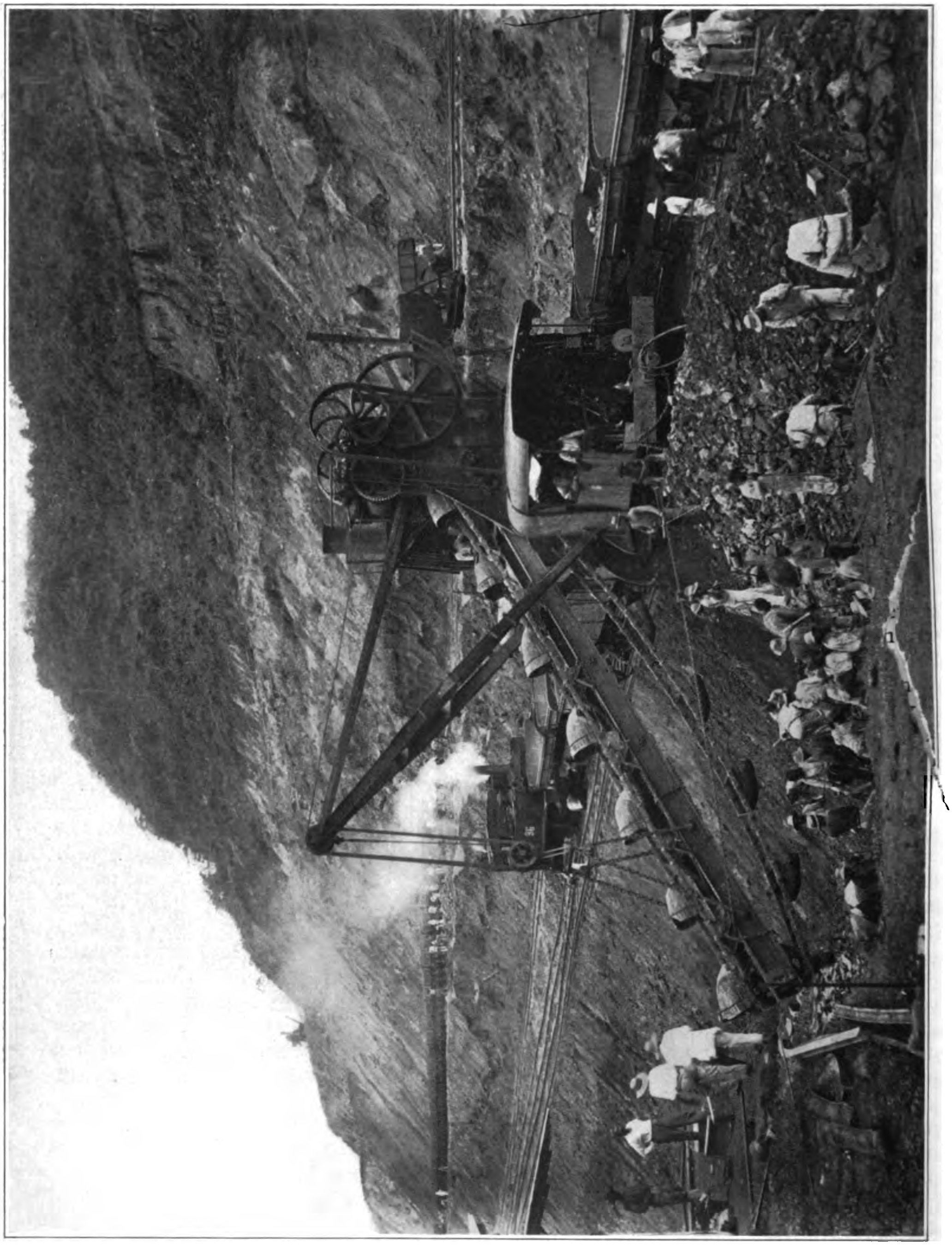
* See page 472.



From W. P. Tisdel

Steam Shovel at Work in the Culebra Cut

SCOURING THE WORLD FOR LABORERS

Then the coasts of Africa were scoured for able-bodied men, but even there after a short time the promises of remunerative prices for their services ceased to draw men to the canal zone. I have seen a ship come into the port of Colon from the coast of Africa, where it had been sent under a most liberal contract on which it was expected to bring 1,500 or 2,000 men for the canal working parties, with only one or two hundred on board. It was estimated that their passage money cost the canal company in the neighborhood of $1,000 apiece, and yet one-half of them were invalided to the hospitals almost as soon as they landed. Thus the enormous cost of the voyage was the principal result of such expeditions.

PREVENTIVE SANITATION

The climate was not so much the cause of this awful havoc among the laborers as the want of preventive sanitary measures. My experience, which has covered portions of five or six years in Isthmian waters, leads me to approve what has been reported by the U. S. minister to Panana as given in THE NATIONAL GEOGRAPHIC MAGAZINE of October, 1904. It will bear repeating here. He says:

"When the able sanitary corps, which has charge of bettering the health conditions in the Isthmus has carried out its plans for the improvement of the canal strip and the cities of Panama and Colon, there is no reason why the Isthmus should not be one of the healthiest places in the world. . . . There has been hardly a single instance of serious illness among the considerable number of young men employed here in work connected with the canal, while the percentage of sickness among the larger group of laborers employed at Culebra is not greater than among those engaged in similar excavating work in the United States. Among the 400 marines located half way across the Isthmus, at Empire, there has not been a single death from local diseases, while the percentage of those in the hospital is not larger than would be found at the average post in the United States."

THE SANITARY PRECAUTIONS TAKEN BY THE U. S. NAVY

As the sanitary condition of the Isthmus is in the hands of army and navy officers, I want to make a statement concerning what I consider a reflection on these services made by a lecturer before this representative body only a few weeks ago. Lest we forget!

A distinguished medical gentleman who recently lectured here stated that neither in the curriculum of the U. S. Naval Academy nor at West Point was any attention paid to the subject of physiology or hygiene, which accounted in part for the great sacrifice of human life which took place among our forces during the Spanish-American war in 1898. While the statistics he gave are based mainly on army records, he by inference made them apply to the navy as well.

As far as the U. S. Navy is concerned, his premises are wrong and his conclusions are wrong. In the first place, there is a chair of physiology and hygiene at the Naval Academy (and one was later established at West Point), which is and has been occupied by distinguished medical officers of the navy, and the young men there undergoing instruction are given a very good general knowledge of physiology and hygiene—sufficient at all events to enable them as executive officers of ships to understand at least the questions which arise in the practical parts of the profession. Each ship in our navy carries one or two and sometimes three medical officers, so the sanitation of our ships is well provided for. In fact, the success that has followed the navy's efforts to stamp out disease has been a source of pride. No brighter page in the history of sanitary science can be found than that which pertains to the medical records of the navy during the summer of 1898. To prove this let me quote from the report of the Surgeon General of the Navy dated October 1, 1899:

"In the returns from the squadron operating in Cuban waters are represented 48 vessels, with an average complement of 11,599. As showing the effects of war service upon the crews of the various types of ships, the monitors gave an average rate per 1,000 of force sick daily during the war of 17.48; for 1897, 10.87; battleships, 12.34, against 12.38 in 1897; cruisers, 16.01, as against 17.31 for 1897; gunboats, 15.74, as against 20.14 for 1897."

THE HEALTH OF OUR SQUADRONS IN TIME OF PEACE AND WAR

So that for this squadron, in spite of diseases especially incident to the tropics in midsummer, the daily average sickness for the whole force of nearly 12,000 men was but 1.56 per cent.

Thus it will be seen that, leaving out the monitors, the average sickness during the war of 1898 was less in reality than in the peace year 1897, when our squadrons summered at some of the health resorts along our Atlantic coast; but, even including the monitors, the general average of sickness is less for the war period than that for the "trying times of peace." Sailors have a trite saying that "those who go down to the sea in ships see the wonders of the deep, but those who go in monitors see the infernal regions." This record of comparative sickness for the monitors would seem to lend credence to this statement.

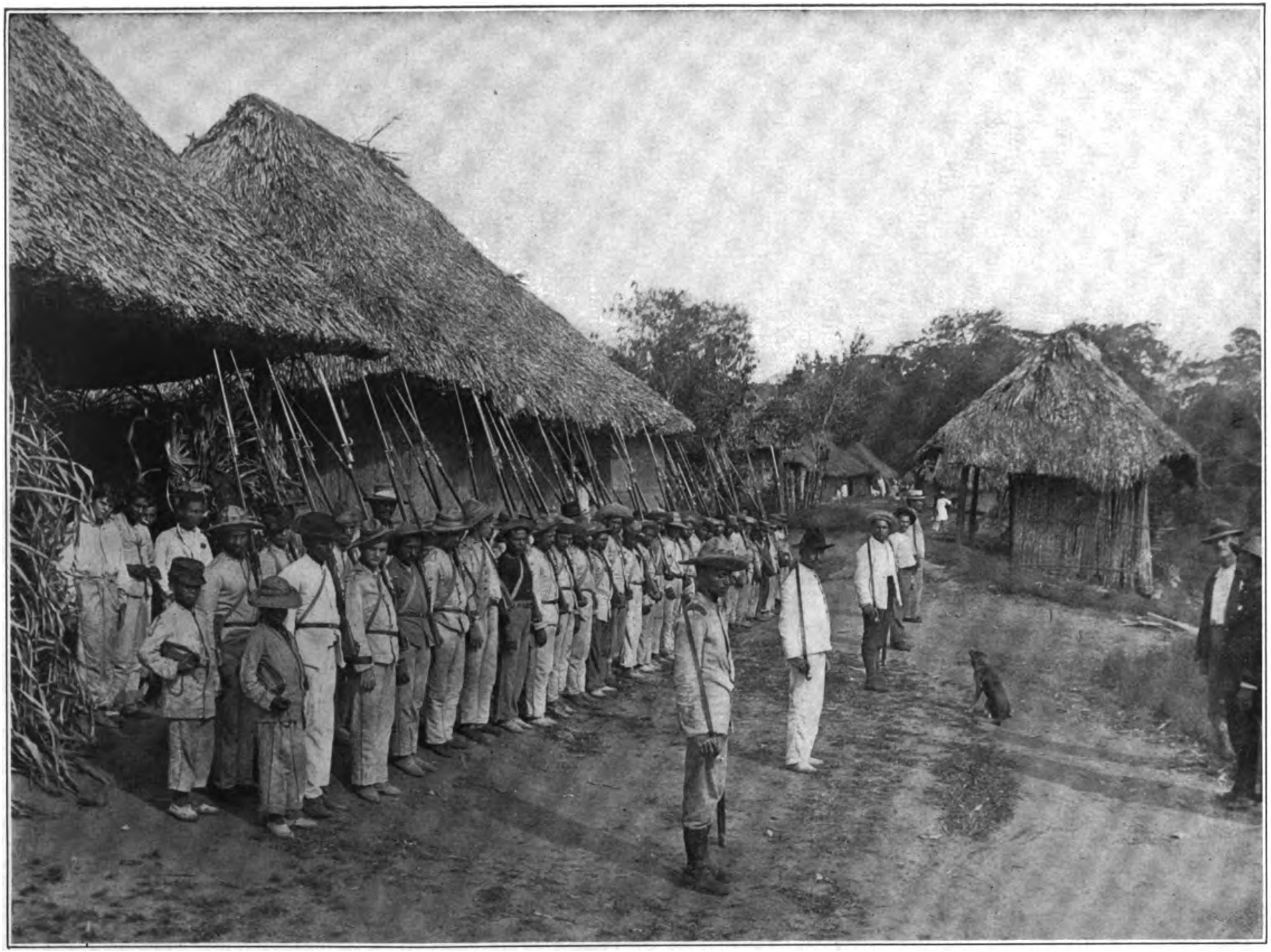
A slightly better result than this was obtained from Admiral Dewey's squadron in the Philippines during the same period.

It may be remembered also that the Navy Department sent a battalion of marines to Cuba during the war period, the average strength of which was 588. On June 10 a landing was made at Guantanamo, where the battalion was in camp for the remainder of the war and until some time after the main force of the army had left for home. The daily average of this force sick was but 2.23 per cent. Remember, this was shore service, the same as in the army. The Surgeon General's report continues: "There were six deaths, all of which occurred in the engagements with the Spanish troops, *not a single fatal case occurring from disease.*" If there is any town in the United States with an equal number of inhabitants that had less sickness for the same period, I would like to see the statistics. Let this statement be compared with Japanese records and the disparagement will not appear so great as that given by the learned doctor.

With the sanitary corps on the Isthmus in charge of such men as Col. William C. Gorgas, U. S. A., chief sanitary officer, whose record as a destroyer of yellow-fever germs in Cuba recently has given him fame, assisted until recently by Medical Director John W. Ross, U. S. N., director of hospitals, and other officers of the army and navy, we need not fear the result of any comparisons made under like conditions with any people on the globe. Dr Ross has been connected with various important sanitary enterprises during his long and useful career in the navy. As long ago as 1878–1879 he made an enviable record as a volunteer in the yellow-fever epidemic of east Florida, for which he was promoted by special act of Congress in 1888.

THE PANAMA PURCHASE A GREAT BARGAIN

That the government of the United States has secured a great bargain in the purchase of the assets of the Panama Canal Company is beyond question. When de Lesseps undertook the man-



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Panama Soldiers at a Village on the Bayano River, Guarding the Pass on the Route from Colombia agement of the great enterprise which should cut the western continent in two he laid great stress on the fact that problems that seemed insolvable at the time would become simplified by the growth of engineering knowledge developed in the course of the construction work. No engineering scheme has ever been so exhaustively studied as that for building the canal. Immense sums of money have been spent to study the *don'ts* of the problem and still larger amounts have gone to eliminate the *misfits* of the personnel who should control its destiny. No value can be set on this accumulation of knowledge which the Commission can use as a powerful weapon in weaving together the new plans which are to bring our work to a successful issue.

But aside from these "consequential damages," as they might be called, and which would have cut a large figure in the beginning of operations in any new field, the visible assets turned over to the United States are well worth the price paid for them. The popular mind is rather apt to estimate the property delivered to us by the French company as consisting of but little more than the partially dug canal and the Panama Railroad, but a study of the schedule of equipment will show scores of machine shops, some 2,500 houses built of wood, stone, and metal, for all conceivable purposes, and which will accommodate from 15,000 to 20,000 people; hospitals, extensive in numbers and in size, which represent an investment of a vast sum of money. These buildings not only account for a good slice of the purchase price, but as they would all have to be built before work can be systematically carried on, the government is saved the expense of these preliminaries. The labor question, always a serious one, here becomes vital. The loss by sickness alone, before the people who are required to work on the canal could be comfortably housed, would greatly augment the total cost of construction. This expense account would be a large factor in any original operations, say at Nicaragua.

One of the greatest benefits that has accrued to us and on which no money value can be placed is our power to absolutely control the 10-mile strip bounding the limits of the canal zone. No one who has not had to deal with the delicate questions which constantly arise on the Isthmus with reference to our government's guarantee to keep open the transit and to safeguard the sovereignty of the country through which it passes can realize the difficulties and expense which this sacred obligation has entailed.

A SEA-LEVEL CANAL

The first definite engineering plans for the construction of the Panama Canal have just been submitted to the Isthmian Canal Commission under date of February 14 last by the engineering committee of that body, consisting of Commissioners Burr, Parsons, and Davis. The principal recommendations are summed up in this resolution:

"*Resolved*, That this committee approve and recommend, for adoption by the Commission, a plan for a sea-level canal, with a bottom width of 150 feet and a minimum depth of water of 35 feet, and with twin tidal locks at Miraflores, whose usable dimensions shall be 1,000 feet long and 100 feet wide, at a total estimated cost of $230,500,000. Such estimate includes an allowance for administration, engineering, sanitation, and contingencies amounting to $38,450,000, but without allowance for interest during construction, expense of zone government and collateral costs, and water supply, sewers, or paving of Panama or Colon, which last items are to be repaid by the inhabitants of those cities."

The committee estimates that a sea-level canal can be completed within from ten to twelve years from the present time.

The committee decided that under no

circumstances should the surface of the canal be more than 60 feet above the sea, and estimates that at this level the cost would be $178,013,406. A 30-foot level is estimated to cost $194,213,406.

It is recommended that the Chagres River be controlled by a dam at Gamboa, built to a crest height of 200 feet, and the waters of the lake thus created disposed of through tunnels. The work on the foundation of the dam will require from one to one and a half years, and the committee reports should begin at once. The dam at this place, it is stated, involves no formidable obstacles, which is not the case at the Bohio location.

The construction of a dam at Gamboa in this connection would also control the Chagres River, except that it would be necessary to provide a safety spillway by the construction of a tunnel some eight miles in length through the divide, discharging the surplus waters of the Chagres into the headwaters of the Juan Diaz, or the alternative plan of constructing a tunnel four miles long through the divide separating the Chagres Basin from the headwaters of the Gatuncillo, a stream which enters into the Chagres Valley at Gatun. Should this latter course be adopted, it would be necessary to construct an auxiliary channel for the Chagres from Gatun to the sea in order to divert its flood waters into the bay eastward of Colon.

The dam would also provide the water supply for the entire line of the canal, including the cities of Panama and Colon. It would also provide a plant for the generation of electric power sufficient to furnish ample power for the operation of the Panama Railroad and for the operation of any machinery that might be used in the construction of the canal. It would require two years to construct this dam, and, roughly estimated, its cost, including spillways, would be between $15,000,000 and $16,000,000, not including the power plant.

Actual work in the Culebra Cut has demonstrated that the entire excavation can be done at a saving of $15,000,000 over former estimates, and is given as a justification for the recommendation for a sea-level canal.

Immediate work is recommended at Colon in constructing a safe harbor. To this end, an outer breakwater is suggested, as well as the construction of an inner harbor at the entrance to the canal. It is recommended that bids be invited for this work.

Other minor features of canal construction recommended include completing the Gatuncillo diversion channel, begun by the old canal company to divert from the canal the Gatuncillo and Mindi rivers and other smaller streams. In connection with this, three small dams must be built—two across the Chagres River near Mindi and one across the Boca Mindi. All of this work is independent of the decision as to a level for the canal, and its immediate execution is recommended. Other subsidiary features depend on the level determined on and are not discussed.

The committee makes these observations in summing up:

"The practicability of certainly and satisfactorily controlling the floods of the Chagres by so simple and economical a method as the Gamboa Lake and its outflow channels, and the reduced cost of excavation as actually demonstrated by the work of the Commission in the Culebra Cut, makes the construction of a sea-level canal at a reasonable cost far more available than has heretofore appeared possible. These recent developments in the conditions attending the construction of the canal are so important as to be almost controlling in character. The remaining element is that of the time required to make the great summit excavation.

"It is to be carefully observed that the results thus far obtained in the Culebra Cut have been reached under disadvantageous conditions of both organization of plant and force. The railroad tracks serving the excavators are yet fragmentary and tentatively placed to serve the purposes of investigation. In both respects the disposition of plant is far more unfavorable, both to economy and celerity of operations, than will be the case when a complete track system has been arranged and laid down to serve a large number of steam shovels operated by an experienced force.

"In the face of these disadvantageous conditions the cost of excavation has been reduced far lower than was anticipated, and it has been demonstrated that each steam shovel may be counted upon to yield an average record of at least 1,000 cubic yards per working day. The chief engineer estimates that with 100 steam shovels installed, with a complete system of tracks serving them, a yearly record of 30,000,000 cubic yards of excavation may be reached without requiring a greater output per shovel or greater speed in working than has already been attained. The rate of working could probably be reached within two years from the present time.

"With the rate of progress which now appears reasonable to anticipate, this committee believes that a sea-level canal, with a tidal lock 1,000 feet long and 100 feet usable width at Miraflores, can be completed within ten to twelve years from this time, the bottom width of the canal being 150 feet and the minimum depth of water 35 feet.

"These considerations have induced this committee to express to the Commission its unanimous judgment that with the contemplated system of working and with the rate of development which appears to be justified by the work now being performed at Culebra, a sea-level canal, free from the restriction of locks, should be adopted. This committee believes that such a canal, with terminal harbors, can be constructed for a sum not exceeding $230,500,000.

THE ADVANTAGES OF A SEA-LEVEL CANAL

"The advantages of a sea-level canal across the Isthmus are most obvious. It would be a waterway with no restriction to navigation, and which could easily be enlarged by widening or deepening at any time in the future to accommodate an increased traffic without any inconvenience to the shipping using it, whereas a lock canal is in reality a permanent restriction to the volume of traffic and size of ships that use it. Although it is possible to design and construct locks adapted to the future transformation to a sea-level canal, that transformation cannot be made without serious inconvenience to navigation and at a cost so great as to be excessive.

"The additional cost of a sea-level canal over that of a canal with locks, with a summit level of 60 feet above mean tide, is $52,462,000, or $79,742,000 more than the estimated cost of the lock canal, with a summit level 85 feet above mean tide, proposed by the former Isthmian Canal Commission, after allowing $6,500,000 for the Colon breakwater and direct entrance not previously estimated. This committee considered this additional expenditure fully justified by the advantages secured."

From this latest report from the canal zone it would seem that there is a possibility of the Commission going back to the first plan of the old Panama Canal Company, and this seems to me, and indeed it has always seemed to me, to be a most desirable outcome of the vast amount of work, thought, and intelligence that has been given the matter. The sea-level canal will surely cost more than if it be constructed on the lock system, but it is more than probable that enough will be saved for maintenance during, say, a fifty-years' service of the canal to pay for the increased cost, and the saving to the 10,000,000 tons of shipping which it is expected will use this great highway of commerce in demurrage will more than compen-

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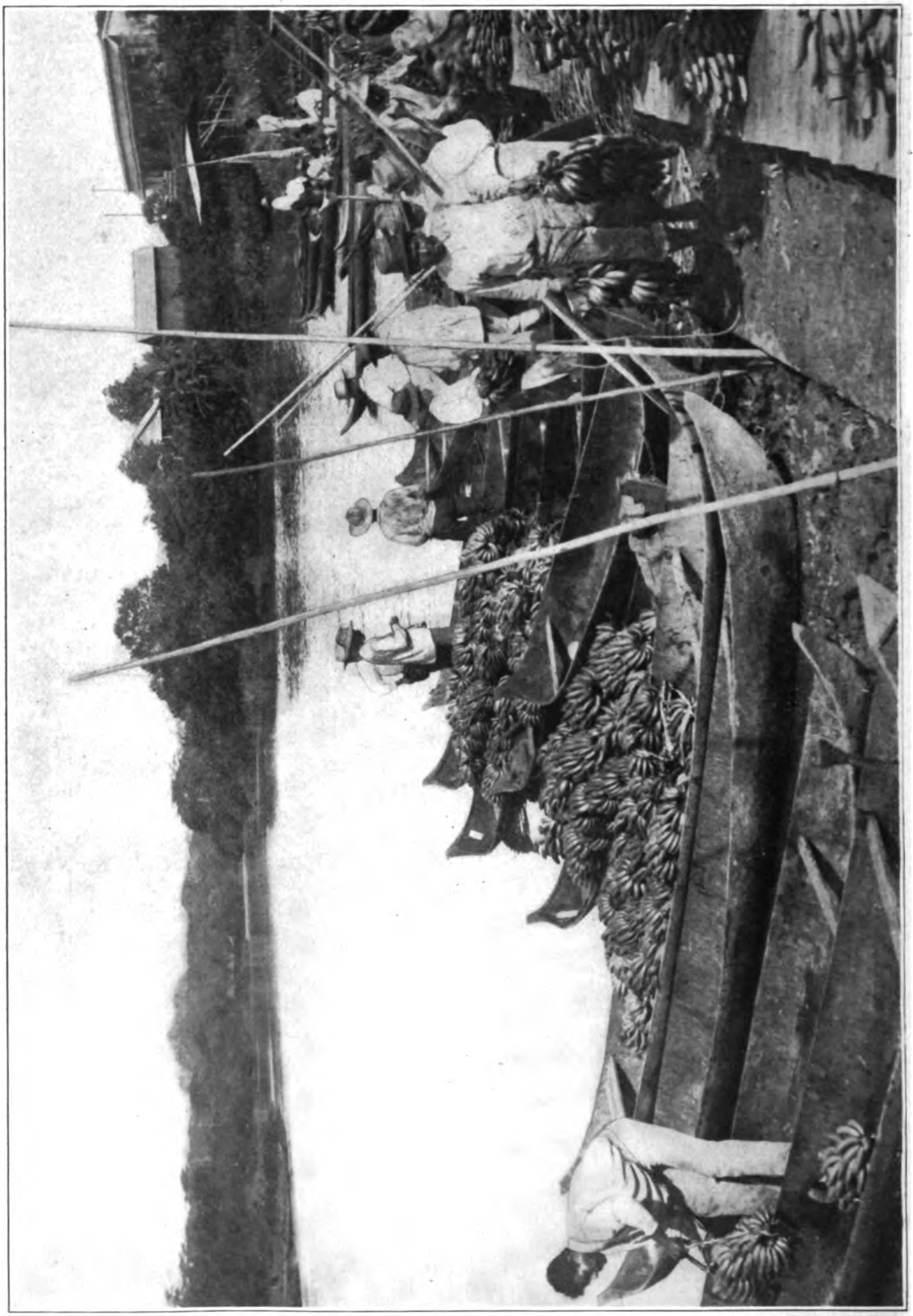
Landing Pigs for Market in the Harbor of Panama City



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Indian "Dug-Outs" on the Chagres River, Bringing Bananas, the Chief Export of Panama, to Gatun sate the people of the United States for the outlay.

As was expected when de Lesseps began his work, wonderful strides have been made in the science of engineering during the last quarter of a century. We can never say that the ideal has been accomplished, but we may state that the science of engineering has reached such a state within the past few years that with the intelligent management which is now being given to the canal problem a new standard in engineering will be set for the peoples of the whole world by American pluck, perseverance, and skill.

PROGRESS ON THE PANAMA CANAL

THE map of the region of the Panama Canal, which is published as a supplement to this number,* shows the plan submitted to Congress by the Isthmian Canal Commission of 1899–1901. It is the only plan on which the Canal Commission has as yet any authority to spend money, and is described by Admiral Chester in his address to the National Geographic Society, published in this number, pages 455–456. The plan will undoubtedly be very largely modified in the near future, but the map will, we hope, serve as a guide to the members of the National Geographic Society in the discussion and changes of the coming months. The most striking feature of the plan here presented is the great lake (shown in light green on the map). The lake covers an area of nearly 40 square miles, and would be artificially formed by the construction of the giant

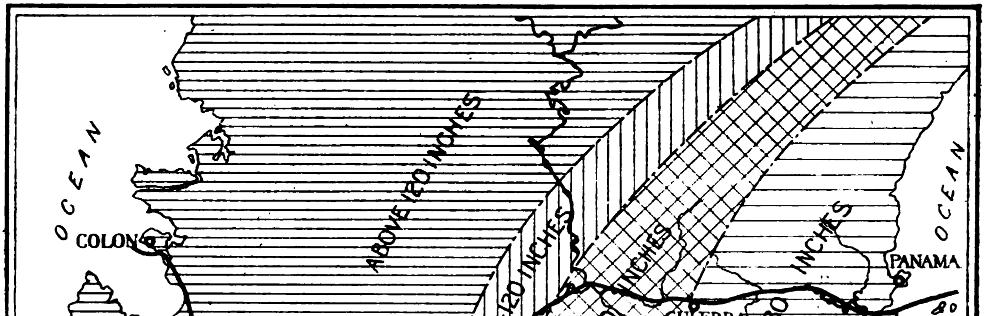

Diagram showing Yearly Amount of Rainfall in Inches on the Panama Isthmus dam at Bohio; but the trouble with this project is that it entrusts too much to the Bohio dam. If the dam gave way, 10 miles of the waterway would disappear and the canal would be put out of business for years.

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* Through the courtesy of Hon. Theodore P. Shonts, President Isthmian Canal Commission.

The investigations of the American engineers during the past two years have brought to light a number of new and important facts which promise to simplify the two principal engineering problems connected with the canal: (1) The control of the torrential floods from the River Chagres and (2) the Culebra Cut. These results are described by Admiral Chester on pages 462–463. The discovery that it will be necessary to go down 170 feet below sea level instead of 128 feet in order to reach bed rock at Bohio makes the plan of the dam at Bohio almost impracticable. Our American engineers have, however, found a better site for a dam at Gamboa, and it is now proposed to construct the dam to control the Chagres floods at this point. The lake thus created would cover about 10 square miles and would be entirely out of the canal.

The building of the dam at Gamboa will not only furnish complete and effective means of control for the Chagres floods, but it has the further advantage of being entirely accessible by the Panama Railroad for the transportation of men and materials. The plan of the dam will probably require a masonry core, with a great mass of earth and rock fill on either side of it, from the waste excavation of the summit cut.

The conditions attending the construction of this dam are in no way unprecedented. The depth of bed rock below water surface is only about one-third that at Bohio and no greater than has already been reached by the use of heavy timber sheet piling for founding masonry structures in the United States. The proposed height of this dam from its foundation to its top is far less than found in a number of masonry dams already built, and the making of the earth embankments on the two sides of the masonry core is simply wasting the material from the summit cut. The construction of the Gamboa dam, therefore, involves no formidable obstacles not heretofore successfully encountered in engineering practice.

Experiments made with American steam shovels show that the Culebra Cut can be made in about one-half the time and at about two-thirds the expense formerly estimated. The length of time originally believed necessary to cut Culebra Hill down to sea-level was the reason that the First Isthmian Canal Company recommended a canal with locks. In view of the diminished expense and the great reduction in the estimate of time required for Culebra Cut, general sentiment seems to be that we should construct a sea-level canal and nothing else. But no plan has as yet been definitely adopted.

WHAT PLAN WILL BE ULTIMATELY ADOPTED IS UNDECIDED

"I haven't as yet the slightest idea what plan the advisory board will recommend for the Panama Canal, and I am certain that not a member of the board has." These were the parting words of a prominent member of the International Consulting Board of Engineers on the Panama Canal as he stepped on board the steamer which carried the consulting engineers to Panama in September, 1905. The board had been in session for several weeks in Washington. It had listened to the various plans submitted by Messrs Bunau-Varilla, Bates, and others, and had digested the results of the past two years' surveys and investigations on the Isthmus by the Walker and Shonts Commissions. But no vote had been taken, nor is any definite decision to be sought until the board has been carefully over the ground together. Not a single member of the board is new at the Panama problem; every engineer has, in some capacity, been associated with it from 5 to 25 years and knows the tremendous difficulties to be overcome. Their decision will be submitted to the Isthmian Canal Commission which may accept it or not as they deem best. The Isthmian Canal Commission recommend to Congress, which alone has the power to determine the plan.

MR BUNAU-VARILLA'S SCHEME

Next to the sea-level canal, the most interesting project is that proposed by Mr Bunau-Varilla. Mr Varilla asserts that it will take the United States many years to construct a sea-level canal, owing to the great difficulty we shall have in securing sufficient laborers. He advocates a plan of his own invention, which he says can be completed in four and one-half years. The canal would be large enough to handle double the amount of traffic which statisticians have calculated will use the canal during the next generation, and can gradually be converted into a sea-level canal without interruption of traffic. Mr Bunau-Varilla's preliminary canal is not unlike that recommended by the first Isthmian Commission, and shown on our supplement. The most interesting feature of the scheme is a dam at Bohio, built entirely of mud and without any artificial core, and of nearly twenty-five times the width of the dam proposed by the Isthmian Commission. The dam would be formed of sandy clay, which is to be sucked up by dredges from the Chagres Valley, and then forced through pipes and deposited in the required position and allowed gradually to harden. The mud, Mr Varilla says, would harden in the manner of cement, and in this way the dam could be constructed at very small expense.

The amount of water that would filter through the ground below the dam would be insignificant. The dam would form a lake, similar in position to the lake shown on the map and extending to the vicinity of Gamboa. At Gamboa another dam built of concrete and steel and strengthened by embankments of earth would form a second lake outside the canal line. Mr Bunau-Varilla proposes two locks at Bohio, ascending to Lake Bohio, and two more locks near Obispo for the ascent to the summit level, which extends from Obispo through Culebra Cut. As the summit level is 130 feet above the sea, the amount of excavation in the Culebra Hill is comparatively small. There are four locks on the Pacific end, making eight in all for the canal.

A CONVERTIBLE CANAL

This serviceable lock canal, which is to be put into commission four and one-half years from the day of commencement, Mr Bunau-Varilla proposes to lower to sea level entirely by dredging. Lake Gamboa is to furnish the electric power to drive the dredges, while into it is to be dumped all the excavated rock and mud. The flow of excavated rock and ground into Lake Gamboa will go on, says the designer, at the rate of 4,000 cubic yards an hour, or 90,000 cubic yards a day, with a very ample margin of safety for accidents. Lake Gamboa, owing to its enormous dimensions, may absorb many times the total cube to be excavated from the canal.

A LABOR-SAVING DEVICE

The following paragraphs are quoted from Mr Bunau-Varilla:

"In all countries of the world dredging is incomparably superior to dry excavation when the ground necessitates no mining. On the Isthmus of Panama this advantage is transformed into an enormous superiority. If there is an instrument of work which counterbalances as much as it is physically possible all the evil influences of the Isthmus, it is the dredge. It counterbalances them because, first, it is the only excavating instrument where the white man can work without expense of physical energy, where he can work seated, so to speak, protected from the sun, protected from the rain; second, because it is the only instrument where the colored man remains under immediate supervision, where he is attached to tasks always the same and under the eye of the overseer; third, because it is the instrument least liable to suffer from an error or an accident. If a little slide comes it withdraws and is not buried, as an excavator or a steam shovel. If the attack of the ground is too hard, it simply stops instead of risking to lose its equilibrium; it does not derail," &c.

DREDGING WAS PREFERRED TO OPEN AIR ROCK EXCAVATION DURING THE OLD PANAMA COMPANY WORK, WITH MUCH LESS POWERFUL DREDGES THAN ARE NOW USED

"Anybody who has worked on the Isthmus with the two systems cannot but be struck with the enormous superiority of the dredge. It is so apparent, so obvious, that I did not hesitate at Culebra, as soon as the conditions became compatible with a dredging plant, to endeavor to substitute the work of the dredge to that of dry digging, and this in a hard clay that necessitated the employment of explosives for the work of excavating machines.

"Unfortunately, the plant was just in action when the collapse of the old company came; but however small has been its period of activity, perhaps a couple of months, the result completely confirmed my expectations and filled my hopes. Unfortunately for the canal, the inevitable and blind reaction which followed such a disaster as that of the Panama enterprise put into suspicion the clearest results obtained. I consider that it has been, among others, one of the most fatal mistakes of the New Panama Canal Company not to continue in the same line of effort.

"What they have done in the Culebra Cut would have been infinitely cheaper and quicker done if they had followed my last plans and not simply continued dry excavations, which I had put in action for a much longer period than the wet process.

"Since that time no more dredging has been done on the Isthmus, and therefore the truth has not been able to be again found and recognized.

"It can be stated with certainty from practical experience, such as the records of the Suez Canal may show, that under the very propitious conditions in which the excavation will be made on the Isthmus, without currents or without variation of water level, it can be made at a cost less than $1 per cubic yard, including repairs and depreciation of machinery. It can be equally stated from the same Suez Canal records that their rock may be extracted and dumped, including repairs and amortization of machinery, at a cost not reaching 75 cents a cubic yard. As for the hard clay, even with the light blasting it requires, the price ought to be kept below 30 cents a cubic yard with ordinary dredging and much reduced with electrical appliances, even including 12 cents for the amortization of the locks ascending to Lake Gamboa. The excavation of hard clay may be brought still lower with the new dredging apparatus resulting from the combination of cutters and suction pumps, but this is an eventuality of the future, and, though already resting on large experiments in Canada, it is not sufficiently proved adaptable to the isthmian ground to base reasonable and conservative estimates on, such as I give today.

"I have prepared the way for the employment of electricity in the working of the dredges, and I had built in Holland by Smulders an electric-driven dredge in 1895, according to special plans which I drew, and which was, so far as I know, the first electric dredge ever employed in public works. The results I obtained on the River Elsa, in

Spain, have been eminently satisfactory, and convinced me that thereby the dredge could acquire new qualities, reducing the expenses and the risk of accidents by unforeseen obstacles met under water."

ASTONISHING DECREASE OF THE PRICE OF EXCAVATION AND OF TRANSPORTATION

"Such a distribution of power under electrical form will practically leave on board the dredge but an insignificant number of men, and one may readily understand the extraordinary economy of such a system of excavation, producing 6,500 cubic yards in twenty-four hours with three shifts of 15 men, say with 45 men a day, even admitting the average abnormal price of $3 per man. The price of excavation proper will be reduced to $135 for 6,500 cubic yards, or about two cents a cubic yard, for the labor. This will be associated with a very reduced amount of expense for the repair of machinery, owing to the employment of electricity, and with no expense to speak of for the generation of power, which will be given by the fall of Gamboa Lake.

"The transportation would also be realized at a cost of perhaps one cent a cubic yard.

"The scows would have electric-driven screws and would take their power from a trolley line along the summit level and on the lake. One line would be for scows going to the dump and the other for scows returning. Assistance of tugs would only be required near the dredges, near the locks, and near the dumping places.

"I firmly believe that such a plant would reduce the price of excavation to a level difficult to believe.

"From every point of view, one must consider that the substitution of wet for dry excavation, if so understood, will create a veritable revolution in the prices and in the output of the work, owing to the great economy, efficiency, simplicity, and limitation of labor thus realized."

Mr Bunau-Varilla proposes that the sea-level canal when completed shall be 600 feet wide at the surface and 500 feet wide at the bottom and have a minimum depth of 45 feet at low tide. This would mean a canal three times wider and 10 feet deeper than the sea-level canal described on pages 462–464. He makes the further astounding claim that this immense sea-level canal by the process of dredging can be built in the same time required for the small sea-level canal (twenty-five years) if the latter is excavated by the dry process, and that the former will cost $300,000,000 as against $230,000,000 for the latter.

THE LABOR PROBLEM

The Isthmian Commission have now from 11,000 to 12,000 men at work, and of these 1,500 are Americans; 2,000 of the men are employed by the sanitary department, while the others are engaged in constructing sewerage and water systems, in building and repairing houses, in constructing tracks fo cars, and in getting everything ready for active digging of the canal. From 500 to 1,000 men are landing at the Isthmus each month seeking employment. They come from the West Indies principally, and a good number from Colombia.

Of the labor problem, Secretary of War Taft says in a recent report:

"The French Panama Company did much of its work with Jamaica negroes, and a large part of the 3,000 employés now engaged by the Commission is composed of Jamaicans; but it will not be easy to secure all the Jamaican laborers that will be needed. The governor of Jamaica, Sir Alexander Swettenham, whom I visited at Kingston, was unwilling to consent to our taking 10,000 laborers from the island unless we deposited five pounds sterling ($25) per laborer with the island government to meet the burden which his leaving the island would probably throw on his parish under the poor law of the island for the support of those dependent on him. He also insisted that we should agree to pay the expenses of the return of each laborer, whether he was satisfactory or not and whether he abandoned the work in violation of his contract or not. It is probable, however, that Jamaica laborers will come voluntarily in considerable numbers to the Isthmus, because there are two direct lines between Kingston and Colon, the fare is only $5 a person, and the wages paid in the canal zone are double those paid in Jamaica. Indeed, the governor informed me that about 6,000 Jamaicans were leaving the island annually to work in Panama and Central America. It is hoped that satisfactory labor may be obtained in Porto Rico.''

The labor problem will probably be harder to solve than any of the engineering difficulties.

THE STORMS AT COLON

In view of Admiral Chester's account of the destruction in Colon harbor caused by the terrible northers (p. 457), the following experience of the Isthmian Commission in January, 1905, is interesting:

The norther began blowing soon after noon of January 26 with such force that three steamships in the harbor of Colon at that time were compelled to seek safety by putting to sea and remaining away for three days. The U. S. Ship *Dixie* was preparing to leave at about that time and was obliged to hasten her departure to escape the danger of the storm. Not a vessel of any description remained in the harbor except two schooners in the slips adjacent to the Panama Railroad station, which were tied by a number of cables at a sufficient distance from their piers to prevent damage from excessive pitching and rolling. They could not get away, and were compelled to ride out in the gale in grave danger to themselves and to the neighboring piers.

At the time of the committee's visit storm waves of great magnitude and force were rolling directly into the harbor, breaking over the entire water front of that part of Colon known as Aspinwall and blocking the marginal streets with deluges of water and great quantities of coral rock and other débris. The same effects were produced on Christobal Point, seriously injuring a number of houses and rendering them uninhabitable, as well as putting out of use the marginal street. The magnitude and violence of the wave action along the entire water front of Colon not only drove to sea every vessel that could get away, but it also endangered the piers or wharves, some of which have been heretofore seriously damaged in similar storms. Further than this, great inconvenience and some loss was caused, not only to the shipping interests affected, but also to the canal work in interrupting the discharge of cargo urgently needed and in other ways injuring isthmian transportation.

These storms occur on the average but once or twice a year, and during some years they do not occur at all. For probably not less than three hundred and sixty days in the year the harbor of Colon is free from any objection of this kind. If the construction of the canal were a purely commercial enterprise, the protection of an outer terminal harbor open to storms at rare intervals, as in this instance, would not be justified. This project, however, is a great public work by the United States Government, in which no feature contributing effectively to either safety or efficiency should be omitted.

Plans and specifications are being prepared for a breakwater extending across the mouth of Limon Bay approximately on the line drawn from the light on

Toro Point to the Colon light. This breakwater will probably be designed in two parts, each about 4,000 feet long, with an opening between them 700 to 800 feet wide for the entrance of ships.

REMOVING SOURCES OF INFECTION

One of the most interesting features of the work has been the blood examinations to determine the malarial index of infection of the native population.

About 80 per cent of the natives, says Colonel Gorgas, at the present time have the malarial parasite in their blood. Four times out of five when a female *Anopheles* bites one of the natives she becomes infected, and when she, in turn, bites one of our nearby laborers he becomes infected. It is thus evident that our force will rapidly be used up, just as was the French, unless our sanitary measures prevent it. There are two means of protection—quinine, which is harmless to man and fatal to the malarial parasite, and the destruction of the mosquito.

The following description of the cleaning of the town of Culebra is an instance of what is being done by our American sanitary corps throughout the canal zone:

The brush in the vicinity of the town has been removed and the streets, which are badly paved, are being kept clean. All manner of water containers were found buried under the brush, removed, and by removing the same the breeding places of the *stegomyia* were destroyed. The mosquito-proof water barrels have been regularly inspected and are in good condition. As a relatively large non-immune population live at Culebra, every effort is being made to stop the breeding of *stegomyia* in the vicinity. The garbage from each house is regularly removed, as well as the nightsoil from the pail closets that now exist. The surface drains are being kept in shape, and no mosquito larvæ are visible therein. All hogs have been removed from the town and all horses and cows are kept tied to stakes to prevent the ruination of the existing system of drainage.

THE MOSQUITO CAMPAIGN IN PANAMA CITY

Colonel W. C. Gorgas, Chief Sanitary Officer of the Isthmus, in his official report for July, 1905, describes the ceaseless fight waged by his corps against mosquitoes:

"The Administration Building in the city of Panama has been kept '*stegomyia* proof' during July. No eggs of *stegomyia* or other mosquitoes were found during the month, although all containers in this building, which is quite large, have been carefully and continuously scrutinized daily. This building is being fumigated every two weeks. After the two fumigations in July the floors were carefully swept and no mosquitoes were found, although the fumigations were strong enough to kill the flies which had entered the building. It takes a longer and stronger fumigation to kill flies than to destroy mosquitoes. There are about 400 employés, mostly non-immune Americans, in this building, who are specially anxious not to contract yellow fever, and it is reported by them that no mosquitoes are present. The building is undoubtedly a safe place at present for non-immunes.

"There is quite a noticeable decrease in the number of *stegomyia* present in Santa Ana Park since the same was trimmed out by this department in June. No cases of yellow fever or suspects were found in this vicinity during July, although it seemed to be a focus in previous months.

"The house-to-house inspection force has been increased, and some sections of the town are inspected every four days, and all houses and yards are inspected at least every six days.

"Whenever the inspector finds a water deposit containing mosquito larvæ the same is emptied out. Every room of each house is carefully inspected for mosquito larvæ in water-containers placed therein. The work of the inspectors is also sufficiently checked, so that we know that the work is being properly and thoroughly done.

"During July, 1905, 5,189 house and yard inspections were made, and the mosquito larvæ (mostly in the early stages of development) were found in 579 of the houses inspected. By means of this continuous inspection at short intervals the mosquito larvæ are destroyed before they reach the pupal stage.

"The streets all over the city are being constantly torn up for the installation of the water and sewer systems. The rainy season is at hand, and so we have a collection of pools and water holes all over the city. A brigade of oilers is at work and these water surfaces are being kept covered with oil. The house-to-house inspection, combined with the work of the oil brigade, is giving good results."

SPLENDID RESULTS OF VIGILANCE

A comparison between the conditions that obtained during the first year of canal work under French administration and present conditions shows how successfully the United States is solving the question of sanitation. In 1881 the French reported an average force of 1928 men on the Isthmus, with a death rate of 66.8 per thousand, while in the Ancon hospital alone the deaths from yellow fever reached the proportion of 23.7 per thousand. In reassuring contrast to that record, the death rate on the canal zone among the 10,000 employés May, June, July (1905), was but 2.6 per thousand. This would make an annual mortality of about 10 per thousand. Of 12,000 men at work during August, 301 were constantly sick, or less than 25 per thousand.

The number of cases of fever, most of which recovered, decreased from 72 in June to 28 in July, due to the scientific efforts of the sanitary officers in screening, cleaning, draining, and taking all the other precautions that our Cuban victory over the fever has taught us to employ. It should be kept in mind that since De Lesseps' time science has solved the problem of checking yellow fever. The United States, therefore, has overcome what seemed to be to the French an unsurmountable obstacle.

PURE-WATER SYSTEM INAUGURATED

The marked decrease in the number of cases in what may be considered one of the worst months of the year is also due, in part, to the new water supply for the city of Panama that was first turned into the mains on July 4. With half pressure on a 6-inch main, 12 streams of water were thrown higher than the Administration Building, and this pure water is now turned in on several mains through the center of the city. Faucets have been attached to the hydrants and the people are now provided with free water. The advantages of this improvement can only be appreciated by those who are acquainted with the conditions that formerly obtained and can scarcely be overestimated. There was a celebration on the Fourth, and of course a game of baseball. The water supply for Colon and the sewerage systems of Panama City and Colon are rapidly nearing completion.

ARRANGEMENTS FOR THE COMFORT OF THE EMPLOYÉS

Another important change that will add to the health of the Isthmus is now well under way, and that is the establishment of comfortable quarters along the entire line of the canal, and by the end of the present month every non-immune employé can be comfortably lodged outside of Panama and Colon, which appear to be the only two foci of the diminishing fever on the Isthmus.

Plans are also under consideration

looking into the establishment of a refrigerating system, so that meat, vegetables, eggs, butter, poultry, and other foodstuffs can be brought from cold storage in the United States, transported in cold storage by vessels to the Isthmus, and then distributed by refrigerating cars to the ice-boxes of the hotels and boarding-houses along the line of the canal. With the installation of this service the personnel of the canal will be properly housed, will have pure water, will be well fed, and the question of proper sanitation will be solved.

The most efficient scientists and engineers are thoroughly convinced that eventually the Isthmus will be a pleasant and agreeable place of abode. They affirm that the fever is not indigenous to the Isthmus. The nights are cool and, with the exception of a short period in the middle of the day, the heat is not oppressive. Both Panama and Colon can be rendered as agreeable places of residence as Mobile or Pensacola.

The Commission have about twelve American steam shovels at work; others are arriving at the rate of about two a month.

The Isthmian Commission found that their employés were not being properly fed; local merchants lacked capacity or enterprise to provide for so many newcomers; prices for food had nearly doubled in the past two years, with the result that the employés had great difficulty in securing sufficient food of the right quality. In view of this fact, the Commission have made arrangements with an American firm to supply the employés of the company with wholesome food at rates varying from about $10 to $30 a month. The rations must reach a standard set by the Commission, which will inspect the food.

G. H. G.

THE GREAT CANALS OF THE WORLD*

THE Suez Canal is usually considered the most important example of ship canals, though the number of vessels passing through it annually does not equal that passing through the canals connecting Lake Superior with the chain of Great Lakes at the south. In length, however, it exceeds any of the other great ship canals, its total length being 90 miles, of which about two-thirds is through shallow lakes. The material excavated was usually sand, though in some cases strata of solid rock from 2 to 3 feet in thickness were encountered. The total excavation was about 80,000,000 cubic yards under the original plan, which gave a depth of 25 feet. In 1895 the canal was so enlarged as to give a depth of 31 feet, a width at the bottom of 108 feet and at the surface of 420 feet. The original cost was $95,000,000, and for the canal in its present form slightly in excess of $100,000,000. The number of vessels passing through the canal in 1870 was 486, with a gross tonnage of 654,915 tons; in 1875, 1,494 vessels, gross tonnage, 2,940,708 tons; in 1880, 2,026 vessels, gross tonnage, 4,344,519 tons; in 1890, 3,389 vessels, gross tonnage, 9,749,129 tons; in 1895, 3,434 vessels, gross tonnage, 11,833,637 tons; and in 1900, 3,441 vessels, with a gross tonnage of 13,699,237 tons. The net profits of the canal for 1903 were 65,579,347 francs ($12,500,000) and the stockholders received dividends of 12 per cent.

The canal is without locks, being at the sea level the entire distance. The length of time occupied in passing through the canal averages about eighteen hours. By the use of electric lights throughout the entire length of the canal, passages are made at night with nearly equal facility to that of the day. The tolls charged are 9 francs per ton net register, "Danube measurement," which amounts to slightly more than $2 per ton, United States net measurement. Steam vessels passing through the canal are propelled by their own power.

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*The facts in this article are derived from an exceedingly instructive monograph published (1905) by the Bureau of Statistics of the Department of Commerce and Labor, entitled "The Great Canals of the World," by O. P. Austin.

THE CRONSTADT AND ST PETERSBURG CANAL

The canal connecting the Bay of Cronstadt with St Petersburg is described as a work of great strategic and commercial importance to Russia. The canal and sailing course in the Bay of Cronstadt are about 16 miles long, the canal proper being about 6 miles and the bay channel about 10 miles, and they together extend from Cronstadt, on the Gulf of Finland, to St Petersburg. The canal was opened in 1890 with a navigable depth of 20½ feet, the original depth having been about 9 feet; the width ranges from 220 to 350 feet. The total cost is estimated at about $10,000,000.

THE CORINTH CANAL

The next of the great ship canals connecting bodies of salt water in the order of date of construction is the Corinth Canal, which connects the Gulf of Corinth with the Gulf of Ægina. The canal reduces the distance from Adriatic ports about 175 miles and from Mediterranean ports about 100 miles. Its length is about 4 miles, a part of which was cut through granitic soft rock and the remainder through soil. There are no locks, as is also the case in both the Suez and Cronstadt Canals, already described. The width of the canal is 72 feet at bottom and the depth 26¼ feet. The work was begun in 1884 and completed in 1893, at a cost of about $5,000,000. The average tolls are 18 cents per ton and 20 cents per passenger.

THE MANCHESTER SHIP CANAL

The Manchester Ship Canal, which connects Manchester, England, with the Mersey River, Liverpool, and the Atlantic Ocean, was opened for traffic January 1, 1894. The length of the canal is 35½ miles, the total rise from the water level to Manchester being 60 feet, which is divided between four sets of locks, giving an average to each of 15 feet. The minimum width is 120 feet at the bottom and averages 175 feet at the water level, though in places the width is extended to 230 feet. The minimum depth is 26 feet, and the time required for navigating the canal from five to eight hours. The total amount of excavation in the canal and docks was about 45,000,000 cubic yards, of which about one-fourth was sandstone rock. The lock gates are operated by hydraulic power ; railways and bridges crossing the route of the canal have been raised to give a height of 75 feet to vessels traversing the canal, and an ordinary canal whose route it crosses is carried across by a springing aqueduct composed of an iron caisson resting upon a pivot pier. The total cost of the canal is given at $75,000,000. The revenue in 1901, according to the Statesman's Yearbook, was £621,128, and the working expenses, £483,267. For the year ending June 30, 1903, the canal yielded £55,105 ($275,525) toward paying the £225,000($1,125,000)of interest which the city of Manchester has to pay on the capital invested in the enterprise. The freight-paying tolls on the canal are increasing each year.

THE KAISER WILHELM CANAL

Two canals connect the Baltic and North seas through Germany—the first, known as the Kaiser Wilhelm Canal, having been completed in 1895 and constructed largely for military and naval purposes, but proving also of great value to general mercantile traffic. Work upon the Kaiser Wilhelm Canal was begun in 1887 and completed, as above indicated, in 1895. The length of the canal is 61 miles, the terminus in the Baltic Sea being at the harbor of Kiel. The depth is 29½ feet, the width at the bottom 72 feet, and the minimum width at the surface 190 feet. The route lies chiefly through marshes and shallow lakes and along river valleys. The total excavation amounted to about 100,000,000 cubic yards, and the cost to about $40,000,000. The number of vessels passing through the canal in 1904 was 32,038, with a tonnage of 4,990,287, and the dues collected amounted to about $580,000.

SHIP CANALS CONNECTING THE GREAT LAKES OF NORTH AMERICA

Three ship canals intended to give continuous passage to vessels from the head of Lake Superior to Lake Ontario and the St Lawrence River are the Welland Canal, originally constructed in 1833 and enlarged in 1871 and 1900; the St Marys Falls Canal at Sault Ste. Marie, Mich., opened in 1855 and enlarged in 1881 and 1896, and the Canadian Canal at St Marys River, opened in 1895. In point of importance, measured at least by their present use, the canals at the St Marys River by far surpass that of the Welland Canal, the number of vessels passing through the canals at the St Marys River being eight times as great as the number passing through the Welland, and the tonnage of the former nearly forty times as great as that of the latter. One of the important products of the Lake Superior region, iron ore, is chiefly used in the section contiguous to Lake Erie, and a large proportion of the grain coming from Lake Superior passes from Buffalo to the Atlantic coast by way of the Erie Canal and railroads centering at Buffalo. The most important article in the westward shipments through the Sault Ste. Marie canals, coal, originates in the territory contiguous to Lake Erie. These conditions largely account for the fact that the number and tonnage of vessels passing the St Marys River canals so greatly exceed those of the Welland Canal.

The Welland Canal.—The Welland Canal connects Lake Ontario and Lake Erie on the Canadian side of the river. It was constructed in 1833 and enlarged in 1871 and again in 1900. The length of the canal is 27 miles, the number of locks 25, the total rise of lockage 327 feet, and the total cost about $25,000,000. The annual collection of tolls on freight, passengers, and vessels averages about $225,000 and the canal is open on an average about two hundred and forty days in a year.

The Sault Ste. Marie Canals.—The canals of Sault Ste. Marie, Mich., and Ontario are located adjacent to the falls of the St Marys River, which connect Lake Superior with Lake Huron and lower or raise vessels from one level to the other a height of 17 to 20 feet. The canal belonging to the United States was begun in 1853 by the state of Michigan and opened in 1855, the length of the canal being 5,674 feet, and provided with two tandem locks, each being 350 feet in length and 70 feet wide and allowing passage of vessels drawing 12 feet, the original cost being $1,000,000. The United States government, by consent of the state, began in 1870 to enlarge the canal, and by 1881 had increased its length to 1.6 miles, its width to an average of 160 feet, and its depth to 16 feet; also had built a single lock 515 feet long and 80 feet wide, with a depth of 17 feet on the sills, which was located 100 feet south of the state locks. The state relinquished all control of the canal in March, 1882. In 1887 the state locks were torn down and replaced by a single lock 800 feet long, 100 feet wide, and a depth of 22 feet of water on the sills. This lock was put in commission in 1896. The canal was also deepened to 25 feet. The Canadian Canal, 1⅛ miles long, 150 feet wide, and 22 feet deep, with lock 900 feet long, 60 feet wide, with 22 feet on the miter sills, was built on the north side of the river during the years 1888 to 1895.

The number of vessels passing through the United States canal in 1902 was 17,588, and through the Canadian canal 4,204. In 1900 the number of vessels passing through the United States canal was 16,144, and through the Canadian canal 3,003, showing an increase of 1,200 in the number of vessels passing through the Canadian canal, and a slight decrease in the number through the United States canal, the increase in the number passing through the Canadian canal having been due to the development of the Michipicoten district. The tonnage passing through the United States canal in 1902 was: Registered tonnage, 27,408,021 tons; in 1901, 22,222,334 tons, against 20,136,782 in the year 1900; the freight tonnage in 1901 was 25,026,522 tons, against 23,251,539 tons in 1900. The Canadian Canal shows: Registered tonnage in 1902, 4,547,561; in 1901, 2,404,642 tons, against 2,160,490 in 1900. A marked contrast between the business of the St Marys Falls and Welland canals is found in a comparison of their figures for a term of years. The number of vessels passing through the Welland Canal in 1873 was 6,425, and in 1899, 2,202, a reduction of more than one-half in the number of vessels. The number of vessels passing through the St Marys Falls Canal in 1873 was 2,517, and in 1902, through the American and Canadian canals, 22,659.

THE CHICAGO SANITARY AND SHIP CANAL

The Chicago Sanitary and Ship Canal connects Lake Michigan at Chicago with the Illinois River at Lockport, a distance of 34 miles. The canal was cut for the purpose of giving to the city of Chicago proper drainage facilities by reversing the movement of water, which formerly flowed into Lake Michigan through the Chicago River, and turning a current from Lake Michigan through the Chicago River to the Illinois River at Lockport, and thence down the Illinois River to the Mississippi. The minimum depth of the canal is 22 feet, its width at the bottom 160 feet, and the width at the top from 162 to 290 feet, according to the class of material through which it is cut. The work was begun September 3, 1892, and completed and the water turned into the channel January 2, 1900. The flow of water from Lake Michigan toward the Gulf is now at the rate of 360,000 cubic feet per minute, and the channel is estimated to be capable of carrying nearly twice that amount. The total excavation in its construction included 28,500,000 cubic yards of glacial drift and 12,910,000 cubic yards of solid rock, an aggregate of 41,410,000 cubic yards. In addition to this, the construction of a new channel for the Desplaines River became necessary in order to permit the canal to follow the bed of that river, and the material excavated in that work amounted to 2,068,659 cubic yards, making a grand total displacement in the work of 43,478,659 cubic yards of material, which, according to a statement issued by the trustees of the sanitary district of Chicago, would, if deposited in Lake Michigan in 40 feet of water, form an island one mile square with its surface 12 feet above the water line.

All bridges along the canal are movable structures. The total cost of construction, including interest account, aggregated $34,000,000, of which $21,379,675 was for excavation and about $3,000,000 for rights of way and $4,000,000 for building railroad and highway bridges over the canal. The city and state authorities, by whom the canal was constructed, are now proposing to Congress to make this canal a commercial highway in case Congress will increase the depth of the Illinois and Mississippi rivers to a depth of 14 feet, with locks for fleets of barges from Lockport, the terminus of the drainage canal, to St Louis. This, it is argued, would give through water transportation from Lake Michigan to the Gulf by way of the drainage canal, the Illinois River, and the Mississippi River, and would enable the United States, in case of war, to quickly transport light-draft war vessels from the Gulf to the Lakes. This work of deepening the Illinois River would also give through water connection from Rock Island, on the upper Mississippi River, to Lake Michigan via the Illinois and Mississippi Canal, elsewhere described, which extends from Rock Island, on the Mississippi River, to Hennepin, on the Illinois River. The estimate of the Chicago sanitary district trustees of the cost of deepening the Illinois and Mississippi rivers from the terminus of the ship canal to St Louis to a depth of 14 feet is $25,000,000, including five locks and dams.

THE PEACE OF LATIN AMERICA *

NEARLY three-fifths of the 15,000,000 square miles of the Western Hemisphere is covered by the twenty different nations which are broadly included in the term Latin America. All these nations are republics, in name at least. It may be a mere coincidence or it may be a fact of profound importance, that during the current year the entire area has been practically free from revolution. It is doubtful if the experience of the last eighty years can duplicate the present situation.

We are inclined to regard this as something more than a coincidence. We believe it to be significant, a sign of political development and a proof of increasing stability. We do not attribute the condition to a fear of the "big stick" or to an apprehension of any broadening of the "corollary of the Monroe Doctrine." It is more probable that it is due to two well-defined though little recognized influences. One of these is the force of example, notably that of Mexico. The other is the extension of industry and commerce. There is in all these lands a growing recognition of the fact that revolutions are unprofitable. With the great mass of the people the idea is probably subconscious, but we believe it is there, and that it is busily working out a destiny of peace for our Latin American neighbors.

A Colombian writer, Señor Enrique Perez, recently made an admirable statement of the case for the Latin Americans. He says:

"It should be borne in mind by those who are always ready to pass criticisms on South American affairs that not all nations have had at their disposal the means of improving their conditions which, by a chain of exceptionable circumstances, it has been given to the United States to profit by. Civilization was not carried from Spain to South America, as to a certain extent it may be said that it was transferred from all European countries to the United States.

"The South American countries did not have the same happy chances. The greed for gold and the race for El Dorado were the main inducements of the Spaniards who, at the peril of their lives, crossed the ocean in unfit vessels in a mad pursuit after the gold and all other precious property of the Indians. The Spanish conquerors did not teach the natives, outside of religion, any of the practical methods of life, or rather those considered practical in those days.

"After the conquest was accomplished there came a period, covering three centuries, during which nothing was done by Spain to better the condition of those countries."

This is an interesting and a precise statement of the case. From California to the Southern Andes and from Carta-

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* From the New York Sun.

gena to the Rio de la Plata, the country now known as Latin America was seized by men whose purpose was to find gold, or in other ways to acquire wealth quickly and easily. Simon Bolivar, about 1820, was perhaps the first man who really saw the matter in its broader light. The history of the federation which he established has been in general the history of the entire region. It was an effort to plant a new civilization among a people imperfectly prepared for it.

To those who settled on the coast of what is now the United States the terms freedom and self-government had a definite meaning. The motives which led them to seek homes in the new world were widely different from those which impelled the gold-seekers and the conquistadores who landed further south. Any similarity in the later political structures was impossible.

Signs of development in the southern countries can be traced for somewhat more than fifty years. During the last twenty years the signs have become ever increasingly marked. Mexico, Chile, Peru, Brazil, and Argentina are no longer to be classed among the turbulent.

An ambition for progress and political stability is noticeable in nearly all, if not in all, of the remaining peoples. The people of Cuba, of Guatemala, Costa Rica, and Nicaragua resent the charge or the insinuation that they are hotbeds of revolution. They pride themselves on every added year of domestic peace. Colombia aspires to repeat the experience of Mexico. Cipriano Castro, today almost unique, is a survival of the despot who ruled the peon a century ago, and even in his case the type is essentially modified.

It is perhaps too much to expect that this peace of months will expand itself into a peace of years; but the situation is noteworthy, and we believe it to be deeply significant.

FORESTRY IN CALIFORNIA

CALIFORNIA has over 28,000,000 acres, or over one-fifth of its total area, under forest cover. Much of this land is finely timbered, and, with forest management, will be increasingly valuable for the wood which it can supply. But in California the forests have another use, which, as is well understood in that state, is even more important than the production of timber—to conserve the water supply. The wonderful agricultural development which irrigation has made possible is perhaps the largest fact in California's recent economical history. Because of the need of water and the fear of floods, public sentiment in favor of forest protection in California has always been well in advance of that in other states, as was conspicuously illustrated after President Cleveland, in 1897, proclaimed the 13 Federal reserves, created at the close of his administration. Everywhere else in the West the opposition aroused was so strong that the proclamation was soon afterward temporarily suspended; but a special exception was made in the case of California, where public opinion was from the first strongly in favor of the reserves.

Something less than one-third of the entire wooded area of the state is now embraced in the Federal forest reserves. That the remaining 20,000,000 acres of its forests may be made to serve the public interest in the fullest possible measure, the state has solicited and secured the coöperation of the Forest Service in working out a proper forest policy for it.

But the subject of paramount importance is the prevention and control of fires. A good opportunity for experiment along this line was afforded the service by coöperation with the private owner of an 80,000-acre tract, who had previously introduced a crude fire-protection system. A comprehensive plan was outlined and its execution begun. There has not been time for a thorough trial, but its installation has had an excellent effect. The patrolling of the tract has been greatly improved, and the neighbors now voluntarily report all fires, whether on or off the tract. There has not been a serious fire on that tract this season. This splendid showing is an impressive object lesson. It proves the efficiency of intelligent care and of fighting fires at the start. The present fire laws of the state are incomplete and inadequate. One result of the work of the Service will be the recommendation of a fire law which, if adopted, will be the best ever passed by any state.

The most encouraging fact in forest management is the growing determination of large timberland owners to employ private foresters to handle their holdings. This will ensure a method of lumbering less wasteful than that at present practiced, and, more important by far, it will be the means of better protecting the forests and making them yield a continuous crop. Such expert control will be especially valuable in solving the problem of the best way to get rid of the slash, which, until burned, is a constant menace to the forests. Extensive experiments in slash burning have already been carried on by the Service with satisfactory results.

The study of chaparral has led to fruitful practical conclusions. It shows in California the same remarkable ability to encroach upon and spread over open country that it exhibits in Texas and elsewhere in the semi-arid portions of the southwest. It makes a satisfactory watershed cover and almost constantly replaces a forest destroyed by fire. Its composition varies with aspect and elevation and with damage by fire.

CHINESE LABOR FOR MEXICO

UNITED States Consul Anderson, of Amoy, China, reports that the owners of certain plantations in Mexico, especially in Yucatan, seem to be making an effort to secure Chinese labor for their establishments. According to an advertisement in a native paper, the Japanese now have charge of the work of enlisting men in this proposed agricultural army. The advertisement, as translated, says, among other things:

"About a year ago a certain agricultural concern in Mexico sent a special agent to Fuchau for the purpose of securing Chinese laborers, such laborers to take their families with them if necessary. They were to be shipped to Mexico to work on hemp plantations, but to do no other work. This enterprise had the consent of the governor of Yucatan, Mexico, but owing to the ignorance of Chinese law on the part of the agent, he undertook to issue an official proclamation himself, and consequently his mission was brought to a sudden end by the order of the Mexican consul. The agriculturists of Mexico need labor just as badly now as a year ago, and have applied to the Cho Kiu Kan, emigration agents of Japan, for assistance. . . . Everything set forth in this notice is entitled to confidence. Incidentally, it may be added that the treaty concluded between China and Mexico provides for the free emigration of citizens of either country and for the mutual protection of such emigrants. Emigrants take no risk whatever. It is understood that the foreign office in Fuchau has issued a proclamation on the subject, publishing all treaties and regulations relating thereto."

The response to this proposition does not seem to have been as general from any part of this province as was hoped, but it is probable that it will be general enough to make up a fair-sized shipment of coolies to Mexican territory. Not less than 2,500,000 people from the Amoy district are abroad in such enterprises.

The number of Chinese emigrants leaving Amoy this year seems to be about the same as usual. Something like 75,000 will go to Singapore and the Straits Settlements and between 5,000 and 6,000 to the Philippines. Ten thousand will probably go to Hongkong, Saigon, and other ports. The money sent home by these emigrants is by far the largest financial resource of the people of this district.

POLAR EXPLORATION

THE year 1905–1906 will be the quietest, as far as polar work is concerned, known for some time. Only two expeditions, those of Commander Peary and the Amundsen Magnetic Expedition, are now in the Arctics, none are in the Antarctics, and no others are planned against either Pole.

The latest word from Commander Peary comes by Dr Frederick Sohon of Washington, D. C., who left Etah, Greenland, the last week in August. He reports that the *Roosevelt*, Peary's ship, left Etah steaming north on August 20. Nothing but open water could then be seen toward the north, or when Dr Sohon left several days later. Apparently conditions were very favorable for Commander Peary and it is generally believed that he succeeded in taking his ship at least as far as the entrance of Kennedy Channel. This point is considerably farther north than he has succeeded in getting his supply ship before, which means that his base will be so much nearer the Pole. The *Roosevelt* carried from Etah 68 Eskimo men, women, and children and 250 dogs. Commander Peary will distribute them in stations along the coast.

THE POPULATION OF JAPAN

ACCORDING to the last official Japanese census, the population of Japan had grown from 41,388,313 in 1893 to 46,732,841 in 1903, an increase of 5,344,528 in ten years. This is exclusive of Taiwan (Formosa), which in 1902 had a population of 3,000,111. In round figures the population of the Empire of Japan may be stated at 50,000,000.

Except in the acquirement of Formosa in 1895, there has not been any sudden increase in Japan's population, but a steady increase year after year, beginning with 423,902 in 1894 and closing (for this computation) with 710,332 in 1903, an average increase of 534,000 for each of the ten years.

The 1903 population of Japan proper, namely, 46,732,841, consisted of 23,605,571 males and 23,131,270 females. This equality of the sexes is noticeable, especially as it has continued through all of the ten years.

The population of Taiwan (Formosa), 3,000,111, has grown at the rate of from 68,000 to 84,000 a year since 1898. In 1902 it consisted of 2,953,034 natives and 47,077 Japanese. In 1898 the Japanese in the island numbered 25,585.

The number of deaths in Japan proper was 937,644 in 1893 and 952,252 in 1903, the figures for each of the ten years being nearly the same. It was not so with the yearly births. They were 1,178,428 in 1893 and steadily increased each year, reaching 1,493,599 in 1903. Here we see the necessity for Japan's expansion into Korea. Japan's area is limited and only 12 per cent of it is arable land; consequently providing for 534,000 increase in population each year was a most serious question. That point is settled now, and the Japanese are flocking into Korea.

In the ten years the average marriages per 1,000 of the population of Japan have been 8.71. Divorces averaged 9,400 a year, or 2.13 per 1,000 marriages. That is certainly a low divorce rate for an oriental country.

In 1903 the ratio of urban population was 20 per cent, an increase of 7.5 per cent since 1896, and of suburban 80 per cent, a decrease of 7.5 per cent.

In the seventeen years, 1886-1903, the urban population increased by 4,448,656, and the suburban by 3,215,494. Thus Japan has the American problem to deal with—the overcrowding of people into the cities. WALTER J. BALLARD.

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GEOGRAPHY*

By Rear-Admiral Sir W. J. L. Wharton, K.C.B., F.R.S.

It is sometimes denied to geography that she has any right to consider herself as a science, the objection being apparently founded on the view that it is a subject that can be learned by heart, but not studied on any systematic line or reduced to principles which enable advance to be made, as in the more exact sciences, by continual investigation by means of laws discovered in the course of such investigation. This, it appears to me, is a misapprehension due to an incomplete recognition of what science is and of what geography is.

Science is, in the simplest interpretation, "knowledge," such knowledge as comes from an intimate acquaintance with and study of any subject duly coördinated and arranged. The subjects which the advancing education and civilization of the world have caused to be minutely studied are very many, and as knowledge has increased specialization has become a necessity, until the list of sciences is very long.

Science may be broadly divided into several categories: pure or exact science, such as mathematics; natural or physical science, which rests on observations of nature; moral science, which treats of all mental phenomena.

Some sciences are of ancient foundation, some have arisen from new inquiries and needs of man or from fissure in subjects too wide for convenient treatment as one. Many of them are capable of exact definition, and their boundaries and limits can be well marked. To others no very distinct limitations can be assigned. From their nature they overlap and are overlapped by other subjects, and it is impracticable to confine them by a strict line. Geography is one of the latter.

Geography is one of the most ancient subjects studied with the view of coördinating facts. A desire for exact knowledge of, first, the bearings and distances of one place from another for the purposes of intercommunication must have arisen as soon as men became collected into groups whose growing civilization and needs required travel to obtain what could not be obtained in the community.

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* An address to the British Association for the Advancement of Science, Johannesburg, South Africa, August 30, 1905. Sir William Wharton was unfortunately taken sick only a few days after the address was delivered and died at Capetown, September 29, from enteric fever and pneumonia. He was 62 years of age, and for a number of years had been Hydrographer of the Admiralty.

This was the earliest form of geography, and it is an aspect which still remains, and to some is, in the modern shape of maps, the principal, if not the sole, end of geography.

From the earliest times, however, geographical information included other than topographical data. It was soon found that for the traveler and statesman, whether in peace or war, more was wanted to enable geography to supply requirements. The nature of a country, the supply of food and water, the character of the rivers, the manners and customs of the inhabitants, their language and affinities, the climate, and other matters, were all of much moment, and geography dealt with them all, being, as its name denotes, in the broadest sense a "description of the earth."

After the first crude guesses of relative positions, founded on times occupied on journeys, other knowledge was enlisted in the cause.

Astronomy was soon recognized as the only means by which to ascertain the distances of places far apart and separated by seas, but for many centuries this could only be applied to latitude. Still the scientific geographer had to study and use the astronomical and geodetic methods known.

GEOGRAPHY IS THE PARENT OF MANY SCIENCES

As knowledge increased, the subjects became too wide to be strictly considered as one study, and many have become the objects of special research under different titles.

Geodesy deals with the precise form of the earth and its dimensions.

Geology studies the nature of the materials forming the earth's crust and the changes in it in past ages.

Ethnology and *Anthropology* treat of the different races of mankind.

The study of *Economics* takes note of the conditions of communities and nations, their laws and systems of government.

Botany and *Zoölogy* now concern themselves with the details of vegetable and animal life.

Archæology investigates the remains of past civilizations which cover the earth.

Meteorology strives to unravel and reduce to law the complicated conditions of the atmosphere, its continual movements, and the results which have such varying effect on our daily life.

Oceanography, the study of the phenomena of the sea as distinct from the dry land, is still regarded as an integral part of geography, but is rapidly becoming a subject by itself.

Of all these subjects geography may be considered to be the parent; and though the family be large and has gone off on many separate lines, it is necessary when taking a large and comprehensive view of the united results of knowledge thus gained, especially from the point of view of distribution, to return to that parent and consider them on a general or geographical basis.

I cannot pretend to define geographical science in a clearer or shorter form than that in which it has been already put by General Sir Richard Strachey, and I will quote his words:

"To investigate and delineate the various features of the earth, to study the distribution of land and sea, and their effects upon climate, the configuration and relief of the surface, positions on the globe, and so forth, facts which determine the existent conditions of various parts of the earth, or which indicate former conditions, and to ascertain the relations that exist between those features and all that is observed on the earth."

Strabo, in the opening words of his introduction to his great geography, puts it thus:

"If the scientific investigation of any subject be the proper avocation of the philosopher, geography, the science of which we propose to treat, is certainly entitled to a high place. In addition to its vast importance in regard to social life and the art of government, geography unfolds to us the celestial phenomena, acquaints us with the occupants of the land and ocean, and the vegetation, fruits, and peculiarities of the various quarters of the earth."

This was written when geography included all natural science, and before it gave birth to so many separate subjects; but it sets forth so admirably the aims which the geographer still pursues that it is worthy of remembrance.

GEOGRAPHICAL KNOWLEDGE ESSENTIAL TO THE MAN OF AFFAIRS

It is not advocated, nor is it in any way necessary, that all should study geography in the extended sense thus indicated; but it cannot be too strongly pointed out that an educated man—and education is now essential to the successful conduct of affairs—must have a considerable knowledge of the elementary facts of geography.

These elementary facts are, it is true, of the nature of a lesson, and must be learned, so to speak, by heart by the aid of maps and books; but this is nothing more than making use of the labors of others, without which no advance is possible in any subject, and is common to all studies.

We must, in fact, distinguish between the science of geography, which consists in ascertaining and coördinating new facts and putting them into a shape for the use of others, which is the work of comparatively few; and the practical geography which consists of making use of that work, and, as in many other branches of science, is within the reach of all who choose to devote time to it.

It is impossible to have a clear comprehension of history, whether past or current, without calling in the aid of geography; but unfortunately much history has been written and taught without such aid.

To read the daily papers requires either geographical knowledge or constant reference to maps, and if readers would only make a practice of such reference on every occasion when they are at fault, they would soon find themselves acquiring knowledge of the greatest use to them in the easiest and most interesting manner and with the smallest expenditure of time.

The mistakes made even by those responsible for the conduct of public affairs, by reason of the want of this essential but elementary knowledge, are innumerable, and to this day there are many who consider themselves highly educated and capable men who cannot even rightly understand a map.

GOOD MAPS THE FOUNDATION OF GEOGRAPHICAL KNOWLEDGE

As I have before indicated, good maps are the foundation of all sound geographical knowledge, and these maps must be founded on good surveys.

Now a good survey is a comparatively modern operation, and the parts of the world that have been subjected to it are small indeed.

It is true that we now have general maps of the larger parts of the world, which more or less convey a fair representation of the configuration of land and sea when large areas are considered, but details are sadly lacking almost everywhere.

To many people one map is as good as another. They do not pause to consider on what it is based or what degree of accuracy it probably possesses, but so long as there is a map they are satisfied.

A vast number of existing maps are compiled from the roughest materials; in partly occupied countries, from drawings of small areas placed together as can best be done, by means of places here and there, the relative positions of which are fairly known by distances along roads, with perhaps in some cases angles and astronomical positions; in less civilized parts by routes of travelers laid down by estimation of the distance traversed and direction of march, checked perhaps by a few astronomical observations of more or less value as the traveler possesses or does not possess the necessary skill.

The compilers of such a map have a difficult task. Discrepancies are, of course, multitudinous. Nothing agrees, and one has to accept, reject, and adjust as best he can on his own responsibility and with what knowledge he can procure of the respective trustworthiness of each author.

Happy is he if he has even a few positions on his map which have been properly determined, as between them he is saved from the constantly increasing errors of adding one little area to another, which if carried on indefinitely culminates in great errors.

Of course such maps are of no practical use, save as giving a very general idea of a country, and when required by the administrator or traveler lead to endless mistakes and annoyances.

THE COAST LINE OF THE WORLD PRACTICALLY DETERMINED

The feature of our globe which is now, broadly speaking, most accurately laid down is the coast line. The safety of navigation has caused general marine surveys to be carried on all over the world during the nineteenth century, which have finally determined the position and shape of the boundaries of the sea.

These surveys, executed for the most part by skilled naval officers with proper instrumental outfit, and supplied especially with trustworthy chronometers, and based upon frequent carefully determined astronomical positions, have resulted in this boundary line being delineated with an accuracy, so far as its absolute position is concerned, far in advance of any other main feature in maps. Here I may perhaps explain to those unversed in these matters why this is so.

The position of any spot on the earth's surface can be ascertained in two ways: either by careful measurement by means of an accurate system of triangles from another spot already fixed, or by independent observations of the heavenly bodies and calculations from them, which give the precise latitude and longitude of the place. The former is suitable for positions inland, but entails much time and labor, and is only adopted when a perfect map is to be made, for which it is the indispensable foundation. The latter can be carried on from a ship, and in most circumstances only from a ship, because of the limitations of the methods of determining longitudes.

Longitude can now be satisfactorily and rapidly ascertained in two ways—by the electric telegraph or by use of chronometers.

The places served by the electric telegraph are still few, and its use is therefore restricted; but the chronometer has been in working use for more than a hundred years.

This instrument, which is merely a watch of especial construction, will only keep a steady rate when it is undisturbed by irregular shocks or motions.

No means have yet been found for transporting a chronometer on land without upsetting its regularity, and therefore rendering it useless; but on board a ship it can be so suspended and stowed as to prevent its being disturbed by any ordinary movements of or in the ship. The accurate time of any place departed from, ascertained by astronomical observations, can therefore be carried about on board ship for considerable periods, and by comparison with the local time, also determined by sextant observations of the heavenly bodies, at any required spot on the coast, the difference of longitude is at once obtained with very small limits of error when a number of chronometers are employed. These two simple yet marvelous instruments—the sextant and the chronometer—have thus placed in the hands of sailors ready means of fixing with great exactitude and celerity the position of selected points on coasts all over the world; and it will be seen that, while the detail of the line of coast between such fixed positions will depend upon the degree of accuracy of the survey or sketch, the general line cannot get far out, as it is constantly checked at the selected points.

It is not claiming too much to say that at the present time very few salient points on the coast lines of the world are as much as two miles in doubt.

It should be a source of great satisfaction to the Briton to know that both of these instruments were devised by Englishmen, John Hadley producing the sextant in 1730, in the form still used, on the basis of ideas formulated by Newton fifty years before, and John Harrision the chronometer in 1736. The latter instrument has undergone modifications in detail, but the principle remains the same. It required seventy years before its value was fully recognized and it came into general use.

MARINE SURVEYS BY BRITISH NAVAL OFFICERS

It is a still further satisfaction to think that it is British naval officers who have made by far the greatest use of them in mapping the coasts of the whole world. Since the time of the great Captain Cook, British surveying vessels have been constantly employed in this work, not only in British colonies, but in all parts, aiding and often paving the way for British commerce and for the men-of-war that protect it.

It is difficult to find coasts of any extent that have not been laid down by British marine surveyors. The whole of Africa has been their work. By far the greater part of America, all the south and east coasts of Asia, Australia, and most of the innumerable islands in all oceans have been fixed and laid down by them. Even in the Mediterranean, until very lately, the charts were mostly founded on British surveys, and the improvements now being carried out by other nations on their own coasts in details required for modern navigation do not materially modify the main shapes and positions formerly determined by the British.

It has been, and is, a great work, and I hope I may be pardoned for dwelling on it with pride as the result of the wise administration of the admiralty for many years, and of the immediate labors of my predecessors as hydrographer, and as a very great contribution to geographical knowledge, more especially as I do not think that it is generally realized that this great advance in geographic accuracy is due to marine surveyors.

To give an idea of the comparative accuracy of the chronometer method, I may mention that on taking at hazard eleven places distributed all over the world at great distances from England, the longitudes of which have been recently determined by means of the electric telegraph and elaborate series of observations, I find that the average difference between the chronometer and the telegraph positions is 700 yards. The shapes of the different continents and the positions of islands as at present on our maps and charts will never be altered except in insignificant degree, and the framework is ready for many years' work of land mapping.

THE PERILS OF THE DEEP

It is not to be inferred from what I say that marine surveys are approaching their close. It is far otherwise. The time given to these enormous extents of coasts and seas and the necessarily small scales on which the surveys have been carried on have caused them to be very imperfect in all details. Hundreds of rocks and shoals, both stretching from the land and isolated in the sea, have been missed in the course of them, and loss of ships and life on these unknown dangers still continues. With the increase of shipping, increased number of ships of heavy draft, the closeness of navigation due to steam, and the desire to make quick passages, smaller inaccuracies of the charts become yearly of greater importance.

As an illustration of the condition of affairs, I may mention that in Hamoaze, the inner harbor of Plymouth, one of the headquarters of the British fleet for more than 300 years, a small but dangerous pinnacle of rock was only discovered five years ago, while numerous other dangers of a similar character have been yearly revealed in close surveys of other harbors in the United Kingdom supposed to be well examined and charted in the last century.

There never was a greater need for close marine surveys of places frequented by ships than now.

THE EARLIEST MAPS

It is interesting to look back and see the gradual progress of the delineation of the world and to mark how very recent any approach to accuracy is.

The very earliest maps of any extent of country are unfortunately lost to us. The first man who made a map of which any historical record exists is Anaximander of Miletus, about 600 B. C., but we know nothing of it. A map is mentioned by Herodotus as having been taken in 500 B. C. by Aristagoras of Miletus in the shape of an engraved bronze plate whereon the whole circuit of the earth was engraved, with all its seas and rivers, to influence Cleomenes, King of Sparta, to aid the Ionians against Persia. This was probably the work of Hecatæus, to whom early geography owed much. His works are also only known to us by quotation; but they are especially interesting as containing an early idea of the limits of Africa, which he represents as entirely surrounded by the sea—a circumstance apparently either forgotten or disbelieved in later years.

Erotosthenes, 250 B. C., and Hipparchus, 150 B. C., made great advances, and the former made the first attempt to measure the size of the earth by the difference of latitudes between Assouan and Alexandria in Egypt, an attempt which, considering the great imperfection of his means, was remarkably successful, as, assuming that we are right in the length of the stadium he used, he made the circumference of the globe 25,000 geographical miles, whereas it should be 21,600.

He also devised the system of meridians and parallels as we now have them; but the terms "latitude" and "longitude," to denote positions on those circles, were introduced by Ptolemy.

The maps of Ptolemy, the great Alexandrian astronomer and geographer of A. D. 150, are the earliest we possess. He drew, besides a general map of the whole known world from the southern part of the Baltic to the Gulf of Guinea, north and south, and from the Canary Islands to the China Sea, east and west, a series of twenty-six maps of the different parts.

Ptolemy's maps and his method of representing the spherical globe on a flat surface had a great influence on geography for many years. After his time the Greek civilization waned, and the general decline of the Roman Empire, followed by its disruption by the invasion of barbarians, closed the course of discovery in all branches of research for centuries. It is not too much to say that for 1300 years no advance was made, and until the commencement of exploration by sea, which accompanied the general revival of learning in the fifteenth century, Ptolemy's maps represented the knowledge of the world.

As might be expected, the further he got from the Mediterranean, the greater were his errors; and his representations of eastern Asia and northwestern Europe are somewhat grotesque, though quite recognizable in the main.

Of Africa south of the equator he knows nothing, and his map of it terminates with the border.

AFRICA PROBABLY CIRCUMNAVIGATED 600 B. C.

This is somewhat remarkable, as I am one of those who firmly believe in the circumnavigation of Africa by the Phœnicians sent by Necho, King of Egypt, in 600 B. C. from the head of the Red Sea. As described by Herodotus, the voyage has all the impress of veracity. My personal faith in Herodotus was much strengthened by finding when I surveyed the Dardanelles in 1872 that his dimensions of that strait were nearer the truth than those of other and later authorities, even down to the time at which I was at work, as well as by other geographical tests I was able to apply. When, therefore, he records that the Phœnicians declared that in their voyage they had the sun on their right hand, and says he does not believe it, he registers an item of information which goes far to prove the story correct. Influenced by Hecatæus, who though surrounding Africa by the sea cut it far short of the equator, Herodotus could not conceive that the travelers had passed to the south of the sun when it was in the southern tropic.

No historical incident has been more discussed than this voyage, commentators varying much in their opinions of its truth. But we have today some new facts. No one who has followed the exploration of the ancient buildings in Rhodesia, and considered the information we possess on the early inhabitants of southern Arabia, whether we call them Sabæans or Himyarites, can doubt that the former were mainly the work of men coming from Arabia at a very early date, while the period of time necessary to carry out gold-mining operations over the large areas now found to have been exploited must have been very great.

It seems strange that no record of the constant voyages to this El Dorado should remain, but the very natural desire to keep lucrative information to themselves is not an unknown thing among traders of the present day, while the conditions of society and the absence of written records of south Arabia would make concealment easy.

The Phœnicians, an allied race and the great seafaring trading nation of the Mediterranean, succeeded in keeping the majority of their marts secret, and we have incidents recorded showing their determination not to allow others to follow their steps, while to this day we are very doubtful of the limits of their voyages.

It may be considered certain that while we naturally quote Greek historians and geographers as the early authorities for the growth of geographical knowledge, and that the scientific basis for proper maps of large areas was really provided by them, the seafaring nations—Arabians, Phœnicians, and Chinese—knew a very great deal practically of the coasts of various parts of the Old World that were absolutely unknown to the Greeks.

THE PERIODIC WINDS ALONG THE COAST FAVORABLE

The favorable conditions afforded by those remarkable periodic winds, the monsoons, would in the China Sea, Bay of Bengal, and the Arabian Sea naturally facilitate any attempts at extensive sea voyages, and would lead to such attempts under conditions that in the regions of variable winds would be considered too dangerous and uncertain. The fact that the monsoons in nearly every case blow practically parallel to the coasts in opposite directions is a most important factor in considering early navigation. The direction of the wind itself in such cases roughly guides a vessel without a compass, and the periods of cyclones and unsettled weather between the monsoons would soon be noted and avoided, as they are to this day by the Arabs and Chinese, whose vessels, I have very little doubt, have remained practically the same for thousands of years.

The unknown Greek author of that unique and most interesting document, the "Periplus of the Erythræan Sea," probably of the first century A. D., describes vessels built without nails, the planks of which were bound together by cords, in precisely the same way as many Arab dhows now navigating the Indian Ocean. His personal knowledge of Africa evidently ceased at Cape Guardafui, though he gives information gained from others on the east coast as far as Zanzibar, which—or rather a part on the mainland near—he describes as the limit of trade to the south. We know that Arabs had penetrated further, but no doubt they kept their knowledge to themselves.

EARLY NAVIGATORS HAD CHARTS WHICH HAVE BEEN LOST

These early navigators very probably had charts. When Vasco da Gama first passed along the eastern coast of Africa he found that the Arab dhows had charts. Unfortunately none of them has come down to us, or it would have been interesting to compare them with those of the west coast used by the Portuguese at the time, and which were of the crudest description.

I claim for sailors of all ages that they would be the first to make practical maps of the shape of the coasts. Their safety and convenience demanded it, while it is a far easier task to compile such a picture of the earth from successive voyages along coasts over the sea, where average distances from known rates of sailing and courses from the sun and stars can be more accurately ascertained, than from long and generally tortuous land journeys in directions governed by natural features, towns, and so forth. A navigator *must* be a bit of an astronomer. A landsman to this day seldom knows one star from another.

It was the sea charts, or *portolani*, of the Middle Ages that on the revival of learning first gave respectable representations of the shape of the coasts, at a time when the learned monks and others were drawing the most fantastic and absurd pictures, which they called maps.

At the same time, it must be remembered that in all ages and down to the present day pilots who, within a hundred years were usually carried by all ships, even for sea voyages, jealously keep their knowledge largely in their heads, and look upon good charts as contrivances to destroy their profession, and that such charts or notes as they had they would keep religiously to their fraternity.

The Egyptians were no sailors, but we know that they habitually employed Phœnicians for sea expeditions, while we have the historical record of the Old Testament for their employment by David and Solomon for a like purpose in the Red Sea, and probably far to the south. It is therefore almost impossible to doubt that the Phœnicians were also acquainted with the navigation of the Red Sea and east coast of Africa. Such a voyage as that recorded by Herodotus would in these circumstances be far from improbable.

The varying monsoons which had led the Arabians centuries before to get so intimate a knowledge of the east coast as to enable them to find and work the gold fields would be well known to the Phœnicians and the hardy seamen who braved the tempestuous regions lying between Cadiz and Great Britain would make little of the difficulties of the African seas.

The limit of easy navigation from and to the Red Sea is Sofala. I do not think that it is too great a use of imagination to suppose that it would be from information received in what is now north Rhodesia that it was learnt that to the westward lay the sea again, and that this led to the attempt to reach it by the south.

Once started from the neighborhood of Sofala, they would find themselves in that great oceanic stream, the Agulhas Current, which would carry them rapidly to the southern extremity of Africa.

I, as a sailor, can also even conceive that finding themselves in that strong current they would be alarmed and attempt to turn back, and that after struggling in vain against it they would have accepted the inevitable and gone with it, and that without the Agulhas Current no such complete voyage of circumnavigation would have been made.

As Major Rennell in the last century pointed out, once past the Cape of Good Hope, the periodic winds and, over a great part of their journey, the currents would help them up the West African coast, and the general conditions of navigation are favorable the whole way to the Straits of Gibraltar, the ships keeping, as they would do, near the land; but we can well understand that, as recorded, the voyage occupied nearly three years, and that they halted from time to time to sow and reap crops. I should say that it is highly probable that either Simon's Bay or Table Bay was selected as one of these stopping places.

THE WELL-KNOWN SECRECY OF THE PHŒNICIAN VOYAGERS

No reference to this voyage has been found among the hieroglyphic records, and, indeed, so far few such records of Necho, whose reign was not for long, are known, but that it was regarded at the time as historical is evident, for Xerxes, a hundred years later, sent an expedition to repeat it in the contrary direction.

This, however, failed, and the unfortunate leader, Sataspes, was impaled on his unsuccessful return.

This attempt shows that the greater difficulty of the circumnavigation from west to east, as compared with that from east to west, was not realized, and points to the concealment of any details of the successful voyage.

Of Hanno's voyage from the Straits of Gibraltar to about Sierra Leone, the date of which is uncertain, but from 500 to 600 B. C., we should know little had not good fortune preserved the record deposited in a Carthaginian temple.

But the well-known secrecy of the Phœnicians in all matters connected with their foreign trade and voyages would explain why so little was known of Necho's voyage, and our present knowledge of the extensive ancient gold workings of Rhodesia shows how much went on in those times of which we are wholly ignorant.

I have dwelt perhaps too long on this subject, but it has to me a great interest, and as it has not, so far as I know, been dealt with by a seaman who is personally well acquainted with the ways of seamen in sailing ships and with the navigation of the coasts in question, I hope I may be excused for putting my views on record.

There are several references in Greek and Latin historians to other circumnavigations, but none of them can be trusted, and apart from Necho's voyage we hear nothing of the east and south coasts of Africa until the arrival of the Portuguese at the end of the fifteenth century. But they found a thriving civilization along the coast from Sofala northward—Shirazi, Arab, and Indian.

Ruins exist in many places which have not yet been properly investigated, and we are quite unable to say from what date we are to place the earliest foreign settlements, nor how many breaks existed in the continuity of the gold mining, which apparently was proceeding at or very shortly before the Portuguese visit.

After the recommencement of exploration by sea in the fifteenth century, seamen slowly gathered enough information to draw the lines of the coasts they passed along, and in time—that is, by the middle of the eighteenth century—most lands were shown with approximately their right shapes. But of true accuracy there was none, for the reason I have before mentioned, that there was no exact method of obtaining longitude.

If we look at a general world chart of A. D. 1755—and to get the best of that period we must consult a French chart—we shall find on this small scale that the shape of the continents is fairly representative of the truth. But when we examine details we soon see how crude it all is.

THE BEST CHARTS OF 1755, ON AN AVERAGE, FORTY-EIGHT MILES IN ERROR

I have compared with their true positions the positions of thirty-one of what may be taken as the fundamental points in the world as given in the larger scaled French charts of 1755, from which the general one is drawn, and I find that on an average they are forty-eight miles in error. The errors vary from 160 miles to 2 miles. If the delineation of the coast lines between be considered, the inaccuracies are very much greater.

Very shortly after this date more accurate determinations began to be made. The method of lunar distances was perfected and facilitated by tables published in the various astronomical "ephemerides," and seamen and explorers commenced to make use of it. Still the observation required constant practice, and the calculation, unless constantly made, was laborious, and it was used with complete success by the few. The great Captain Cook, who may be looked upon as the father of modern methods of surveying, did much to show the value of this method; but the chronometer came into use shortly after, and the principal advance in exact mapping was made by its aid, as I have already stated.

There is a vast amount yet to be done for geography. Until we possess publications to which we can turn for full information on all geographical aspects of things on this globe of ours, there is work to be done. Seeing that our present publications are only now beginning to be worthy of being considered trustworthy for the very small amount of knowledge that we already possess, geographical work in all its branches is practically never-ending.

VERY LITTLE OF EXPLORATION REMAINS TO BE DONE

But of exploration pure and simple very little remains to be done. The charm of traveling through and describing an entirely new country which may be practically serviceable to civilized man has been taken from us by our predecessors, though limited regions still remain in Central Asia and South America of which we know little in detail.

I must except the Polar regions, which are in a somewhat special category, as their opening up affords few attractions to many people. But a knowledge of the past history of our globe—fit study for human thought—can only be gained by study of the portions still under glacial conditions.

What is there round the South Pole—a continent or a group of large islands? What is going on there? What thickness does ice attain? Have these regions always been glaciated, and if not, why not? Can we get any nearer the mystery of magnetism and its constant changes by study at or near the magnetic poles? All these and many other scientific questions can only be solved by general geographical research in these regions, and all interested in such questions have been delighted at the recent attempts to gain more knowledge.

The object of these expeditions was frankly and purely scientific. All hope of remunerative whale or seal fisheries had been dispelled by the visit of the Norwegian whalers in 1892 to the region south of Cape Horn, and the known general condition of the land forbade any expectation of other profitable industries, unless, indeed, gold and other valuable minerals should be found, which is always possible. Beyond the fact that exploring expeditions of this character keep alive the spirit of enterprise and bring out the finest characteristics of a race—which is a point by no means to be despised—no immediate practical benefit was to be expected.

Progress under the conditions must be slow, but I think that Great Britain may well be satisfied with the information collected in the Antarctic by Capt. R. F. Scott and his gallant companions The unfortunate detention of the *Discovery* by an unfavorable summer prevented the further coastal exploration which was part of the programme, but gave opportunity for further detailed examination of the inland conditions, which was carried out in defiance of the severest atmospheric and topographical difficulties, and with the greatest zeal and intelligence; and it may be doubted whether science in the end has not gained more than she lost by the unexpected diversion of energy. The healthy conditions which prevailed throughout are a standing proof both of Captain Scott's eminent capacity as a leader and of the cheery spirit which animated the whole expedition. The full results of the scientific observations are not yet worked out, and in many cases for a complete appreciation of their bearing they must be compared and correlated with those of the other Antarctic expeditions, but many highly suggestive points have already been revealed.

For the first time Antarctic continental land has been traveled over for long distances, and though the actual area of new discovery looks small on a map of the world, the distances covered can only be described as extraordinary, and far exceeding the most sanguine anticipations. Few who considered the mountainous coast line of Victoria Land and its complete glaciation, as reported by Sir James Ross from his distant view, thought that it would prove practicable not only to ascend those mountains, but to reach to heights much surpassing them behind.

The reason that it proved feasible is that, while there are occasional heavy snowstorms, the annual snowfall is small, and the surface, therefore, is generally unencumbered with soft deep snow.

And what did Captain Scott find after his memorable struggle up the glacier through the mountains?

An enormous plateau at an elevation of about 9,000 feet, nearly level, smooth, and featureless, over which he traveled directly inland for more than 200 miles, seeing no sign at his farthest point of any termination or alteration in character. So far as could be seen from other journeys, glacial discharge from this great ice-sheet is very small, and practically it appears to be dead. Its accretion by fresh snowfall is insignificant, while on all sides along the flanks of the coastal mountains there are signs of diminution in the mass of ice.

THE GREAT ICE MASS IN THE ANTARCTICS IS APPARENTLY DISAPPEARING

The great ice-barrier east of Ross Island tells the same tale. This magnificent feature presents to the sea a face of perpendicular ice cliffs varying from 60 to 240 feet in height and 450 sea miles long. Sir J. Ross mapped its position in 1841, and Captain Scott finds that it has retreated on an average 15 miles, varying much in different parts.

Should this rate of retreat continue, the whole of this ice mass, so far as Captain Scott saw it, will have vanished in 1,000 years.

As the motion of the ice mass is also about 15 miles to the north in the same time, icebergs covering collectively an area of 450 miles by 30 have been discharged from it in 60 years.

Captain Scott traveled over it nearly due south to a point 300 miles from its face, and then saw no sign of its end.

It is bordered on its western side by a mountainous coast line, rising in places to 15,000 feet. He found the ice practically flat and wholly unfissured, except at the side, where its northerly motion, found to be about 130 feet in the month, caused shearing and vast crevasses. All that is known of its eastern edge is that it is bordered, where it meets the sea, by land from 2,000 to 3,000 feet high, suspected by Ross and verified by Captain Scott. This may be an island, or more probably the eastern side of the great fiord or bay now filled by the barrier.

Captain Scott is of opinion that this great ice-sheet is afloat throughout, and I entirely agree with this conclusion. It is unexpected, but everything points to it. From soundings obtained along the face, it undoubtedly has about 600 feet of water under it.

It is difficult to believe that this enormous weight of ice, 450 miles by at least 360, and perhaps very much more, with no fall to help it along by gravity, can have behind it a sufficient force in true land glacier to overcome the stupendous friction and put it in motion if it be resting on the bottom. It is sufficiently astonishing that there is force enough even to overcome the cohesion at the side, which must be very great.

The flat nature of the bottom of the Ross Sea and the analogies of many geographical details in other parts of the world make it most probable that the water under the whole barrier is deep.

A point on which I have seen no comment is the difference in the appearance of the slopes of Mount Terror. Captain Scott found the bare land showing over large areas, but during the two summers of Ross's visit it was wholly snow-clad. Sir Joseph Hooker, the sole survivor of Ross's expedition, when questioned had no doubt on the subject and produced many sketches in support.

This may be due to temporary causes, but all the information collected by the expedition points without doubt to steadily diminishing glaciation in recent times. We have, therefore, this interesting fact, that both in Arctic and Antarctic regions, as indeed all over the world, ice conditions are simultaneously ameliorating, and theories of alternate northern and southern maximum glaciations seem so far disproved.

But this does not mean that climatic conditions in the Antarctic are now less severe—probably the contrary. It has been pointed out by many that land glaciation may arise from varied primary causes, but one obvious necessity is that the snowfall should exceed melting and evaporation. It need not be heavy, but if it is it may produce glaciation under somewhat unexpected conditions. This would entail a vapor-laden air more or less continuously impinging upon the land at a temperature which will enable it when cooled, either by passing over chilled land or when raised to higher regions by the interposition of mountains, to give up its moisture freely. This condition is not fulfilled when the air as it arrives from the sea is already at a very low temperature.

It was my fortune to spend two long seasons in the Straits of Magellan, and I was daily more impressed by what I saw.

There you have a mountainous ridge of no great height—very few peaks rising more than 4,000 feet—opposed to the almost continuous westerly winds pouring in from the Pacific at a very moderate temperature and charged with much moisture.

The result is that in the latitude of Yorkshire every mountain mass over 3,000 feet high is covered with eternal snow and sends glaciers down to the sea.

I was convinced by what was going on under my eyes that it only required an upheaval of the land of 2,000 feet or so to cover the whole of Patagonia with ice. But then the climate would still not be very severe. The temperature of the wind from the sea would be the same, and such part of it as blew along the channels and on the lower land would moderate the cold caused by the ice-covered slopes.

The shores of the whole of western southern Patagonia, deeply indented with long and deep fiords, indicate, according to all received views of the origin of such formations, that the land was formerly higher, while signs of glaciation are everywhere present.

CHANGES OF CLIMATE

The results of geographical research show us that in many parts of the world climate must have greatly changed in comparatively recent times.

In the now arid regions of northern Africa, central North America, and in parts of Asia, there is ample evidence that the climate was in times past more humid. In a remarkable paper on the causes of changes of climate, contributed by Mr F. W. Harmer to the Geological Society in 1901, and which has not obtained the notice it deserves, it is pointed out how changes in the distribution of the prevalent winds would vastly alter climatic conditions. Like everything else in nature, and especially in the department of meteorology, these questions are exceedingly complex, and similar results may be brought about in different ways; but there can be no doubt that the climate of South Africa would be greatly modified, and more rainfall would occur, if only the cyclonic storms which now chase each other to the eastward in the ocean south of the Cape of Good Hope could be prevailed upon to pursue a slightly more northerly line, and many obstacles to the agricultural prospects of South Africa now existing would be removed. This is, however beyond the powers of man to effect; but, as I have just said, there are other ways of attaining the object, and it is earnestly to be hoped that the attention now being paid to afforestation may result in vigorous efforts to bring about by this means the improvement in humidity so much required in many parts of the country.

NEW KNOWLEDGE OF TIBET

The other recent event in geographical exploration is the result of the expedition to Lhasa. It was an unexpected solution of this long-desired knowledge that it should come from political necessities and by means of a government mission. The many ardent travelers who have dreamed of one day making their way in by stealth have thus been disappointed, but our knowledge is now fuller than could otherwise have been gathered.

The most important fact is the revelation of the fertility of a large part of southern Tibet. Much has been added to topographical knowledge, but the route maps of the secret Indian native surveyors already had given us a rough knowledge of the country on the road to Lhasa. It was not, however, realized how great was the difference between the aridity of the vast regions of the north, known to us from the travels of men of various nationalities, and the better-watered area in the south, though from the great height of the plateau—some 12,000 feet—the climate is very severe. The upper course of the Brahmaputra has been traced by Captain Ryder, but unfortunately a political veto was placed on the project to solve the interesting problem of how this great river finds its way to the Indian plains, and this still remains for the future to unravel.

RECENT STUDY OF THE OCEANS HAS BROUGHT MUCH TO LIGHT

It is of the ocean, more than of any other physical feature of our globe, that our knowledge has increased of late years. Forty years ago we were profoundly ignorant even of its depth, with the exception of a few lines of soundings then recently taken for the first submarine telegraph cables, and consequently we knew nothing of its real vast bulk. As to the life in it and the laws which govern the distribution of such life, we were similarly ignorant, as of many other details.

The *Challenger* expedition changed all this, and gave an impetus to oceanographic research which has in the hands of all nations borne much fruit.

Soundings have been obtained over all parts of the seas, even in the two Polar seas; and, though much remains to be done, we can now form a very close approximation to the amount of water on our earth, while the term "unfathomable ocean" has been shown to have been based on an entire misconception. Biological research has also revealed a whole world of living forms at all depths, of the existence of which nothing was known before.

In my former address, eleven years ago, I gave many details about the sea, of which I will only repeat one—which is a fact that every one should know—and that is that the bulk of the ocean is about fourteen times as great as that of the dry land above water, and that if the whole of that land were thrown into the Atlantic Ocean it would only fill one-third of it.

Eleven years ago the greatest depth known was 4,700 fathoms, or 28,000 feet. We have since found several places in the Pacific where the depth is nearly 5,170 fathoms, or 31,000 feet, or somewhat higher than Mount Everest, which has been lately definitely shown to be the culminating point of the Himalayas. These very deep parts of the ocean are invariably near land, are apparently in the shape of troughs, and are probably due to the original crumpling of the earth's surface under slow contraction.

THE EFFECT OF THE SEA UPON CLIMATE

The enormous area of the sea has a great effect upon climate, but not so much in the direct way formerly believed. While a mass of warm or cold water off a coast must to some extent modify temperature, a greater direct cause is the winds, which, however, are in many parts the effect of the distribution of warm and cold water in the ocean perhaps thousands of miles away. Take the United Kingdom, notoriously warm and damp for its position in latitude. This is due mainly to the prevalence of westerly winds. These winds, again, are part of cyclonic systems principally engendered off the coasts of eastern North America and Newfoundland, where hot and cold sea currents, impinging on one another, give rise to great variations of temperature and movements of the atmosphere which start cyclonic systems traveling eastward.

The center of the majority of these systems passes north of Great Britain. Hence the warm and damp parts of them strike the country with westerly winds which have also pushed the warm water left by the dying-out current of the Gulf Stream off Newfoundland across the Atlantic, and raises the temperature of the sea off Britain.

When the cyclonic systems pass south of England, as they occasionally do, cold northeast and north winds are the result, chilling the country despite the warm water surrounding the islands.

It only requires a rearrangement of the direction of the main Atlantic currents wholly to change the climate of western Europe. Such an arrangement would be effected by the submergence of the Isthmus of Panama and adjacent country, allowing the equatorial current to pass into the Pacific. The gale factory of the western Atlantic would then be greatly reduced.

The area south of the Cape of Good Hope is another birthplace of great cyclonic systems, the warm Agulhas Current meeting colder water moving up from the Polar regions; but in the Southern Ocean the conditions of the distribution of land are different, and these systems sweep round and round the world, only catching and affecting the south part of Tasmania, New Zealand, and Patagonia.

MOVEMENTS OF THE LOWER STRATA OF WATER

In 1894 I spoke of the movements of the lower strata of water in the sea as a subject on which we were only beginning to get a little light. Since that year we have learnt a little more. It is a common idea that at the bottom of the sea all is still; but this is a mistake, even for the deepest parts, for the tidal influence reaches to the bottom and keeps every particle in motion, though such motion is quiet and slow.

Near the shore, however, though still in deep water, the movement may be considerably increased. Cases have occurred in late years where submarine cables have broken several hundred fathoms deep, and when picked up for repair it has been found that the iron wire covering has been literally rubbed away as by a file. This can only be the result of an undercurrent along the bottom moving the cable to and fro. Such a current might be caused by a submarine spring, for there is no doubt that much fresh water finds its way into the ocean in this fashion, but it is more probably generally an effect of acceleration of the tidal movement due to the rising slope of the continent. In connection with this, further facts have come to light in the course of recent marine surveys.

Many isolated shoal spots in the great oceans have figured in our charts, the results of reports by passing sailors who have said they have seen breakers in fine weather.

Such places are the terror of seamen, and it is part of the duty of surveying ships to verify or disprove them. Very much has been done in the last eighteen years, with the result that the majority of them have, as dangers, disappeared. In many cases, however, a bank has been found, deep in the ordinary acceptation of the word, but much less deep than the surrounding sea—solitary ridges, in fact, rising from the ocean floor. Frequently, in examining these banks in search of shoaler spots, breakers have been reported and recognized as such on board the surveying ship from a distance, but on approach they have proved to be small overcurls caused by tide ripplings, and the depth of water has proved to be several hundred fathoms. These ripplings are clearly caused by the small tidal motion in the deep water, generally in these cases of more than 2,000 fathoms, meeting the slope of the submerged mountain range, being concentrated and accelerated until the water finally flows up the top of the slope as a definite current, and taking the line of least resistance, that to the surface, makes itself visible in the shape which we are accustomed to associate with comparatively shallow water.

These cases form remarkable instances of the manner in which extensive motion of water may arise from very small beginnings.

An observation I was anxious to make in 1894 has been successfully carried out since. This was to ascertain whether there was any permanent undercurrent in the Straits of Bab-el-Mandeb due to more water being forced through the straits on the surface by the persistent southeast wind of winter than could be evaporated in the closed Red Sea.

Such return undercurrents have in somewhat similar circumstances been shown to exist in the Dardanelles, Strait of Gibraltar, and in the Suez Canal.

The observation at Bab-el-Mandeb was difficult. The wind is strong and the disturbance of the sea is considerable, while the water is 120 fathoms, or 700 feet, deep. But a surveying vessel maintained herself at anchor there during four days, and, by the aid of an ingenious apparatus sent from England for the purpose, clearly proved the existence of a current of 1½ knots flowing steadily at depths below 70 fathoms out of the Red Sea, while in the upper strata there was a similar current flowing in. In such ways is interchange of water provided for by nature in places where tidal action does not suffice.

MARVELOUS PROGRESS OF AFRICA

In what I fear is a very discursive address I have not mentioned the interior of Africa. In the first place, it is a subject of itself; and as we shall have, I hope, many papers on African subjects, I have thought it better to deal mainly with generalities.

Still I cannot refrain from a few words to express the astonishment I always feel when I hear people complain that Africa goes slow. When I look at what has been effected in my own lifetime, it appears to me that, on the contrary, it has been rushed. The maps I learned from as a boy showed the whole interior as a blank. There are now no parts that are not more or less known. The great lakes have all been revealed; the great rivers have all been traced; Europeans are now firmly fixed with decent governments in parts formerly a prey to tribal wars and the atrocities of the inland slave traffic. Railways are running over regions unknown forty years ago, and one of the most astonishing things to me is that I should be able to hope now to visit in comfort and luxury the great Victoria Falls, which my old friend Sir John Kirk—whom I left the other day hale and hearty—was, with the exception of Livingstone, the first white man to see, after a long and laborious journey in his company in 1860.

I could not help being amused as well as interested at seeing a short time ago a proclamation by the government of Northern Rhodesia, dated not far from Lake Bangweolo, calling on all concerned to observe neutrality during the present war between Russia and Japan. I think that if any one had prophesied to Livingstone, as he lay in 1873 lonely and dying by the shores of that newly discovered lake, that such an edict would be issued in thirty years he would have expressed a doubt as to its fulfillment.

To southern Africa nature has denied two of the features that facilitate rapid progress—good harbors and sufficient rainfall—but the energy of man has done wonders to provide the former where possible, and will doubtless do more, while I believe that the lack of the latter will also be overcome in the same way. The coördinated—or, in other words, the scientific—observations made in many other countries have pointed out a possible solution. On the other hand, the height of the inland plateaux makes it possible for the white man to live and work in latitudes which would under other conditions be tropical.

South Africa must have a great future before it; and, while some present circumstances may delay development of its natural advantages, I am inclined to think that in the long run prosperity may be more solid and material for being reached in the face of difficulties, as has so often occurred in the history of the world.

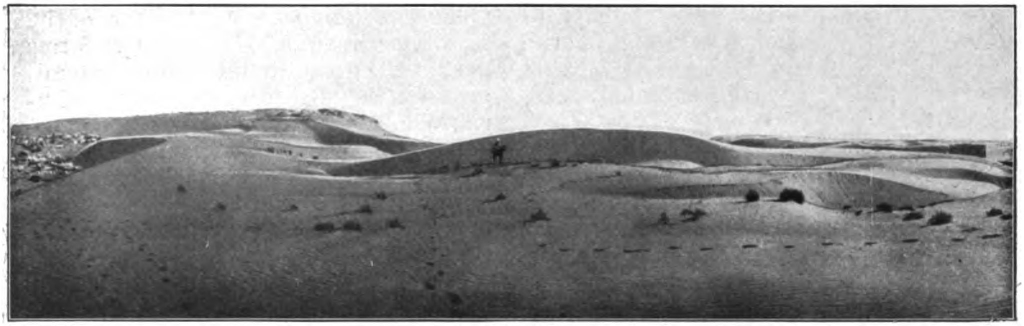
THE SUPPOSED BIRTHPLACE OF CIVILIZATIONS

It can be stated without exaggeration that in central Asia, particularly in Russian Turkestan, there are hundreds, perhaps thousands, of square miles of buried towns and cities. What processes of nature converted the region from a Garden of Eden, filled with millions of prosperous and wealthy people, into waterless wastes, inhabited only by nomads, are mysteries, to solve which little attempt has been made until recently.

Mr Raphael Pumpelly, known so widely for his work in China, suggested to the Carnegie Institution in 1902 that an examination of the Turkestan ruins might (1) reveal the birthplace of civilization, (2) show how changes in man's environment alter man himself, and (3) give a clue to recent geological time, which is now more or less told by guessing. Inasmuch as geological changes have occurred in central Asia since man has lived there, evidence may be discovered among the traces left by the earlier inhabitants which will tell how long these changes were in the making.

The Carnegie Institution gave Mr Pumpelly a grant sufficient to enable him to make an extended reconnaissance of Turkestan. Mr Pumpelly was accompanied by Prof. William M. Davis, of Harvard University, and Mr Ellsworth Huntington. The results have just been published in a special volume by the Carnegie Institution.* In view of the exceeding importance of the investigation, we make the following liberal quotations from Mr Pumpelly's report:

The investigation was proposed because (1) there is a school that still holds the belief that central Asia is the region in which the great civilizations of the Far East and of the West had their origin; and (2) because of the supposed occurrence in that region, in prehistoric times, of great changes of climate, resulting in the formation and recession of an extensive Asian Mediterranean, of which the Aral, Caspian, and Black seas are the principal remnants.



Paikent, a Sand-buried City

The ruins of Paikent represent the type of cities abandoned for lack of water and then buried by the progressive desert sands. Paikent was a great center of wealth and of commerce between China and the west and south till in the early centuries of our era. The recessions of the lower ends of the Zerafshan River brought its doom. Now only the citadel mound and the top of parts of its walls rise above the waves of the invading sands.

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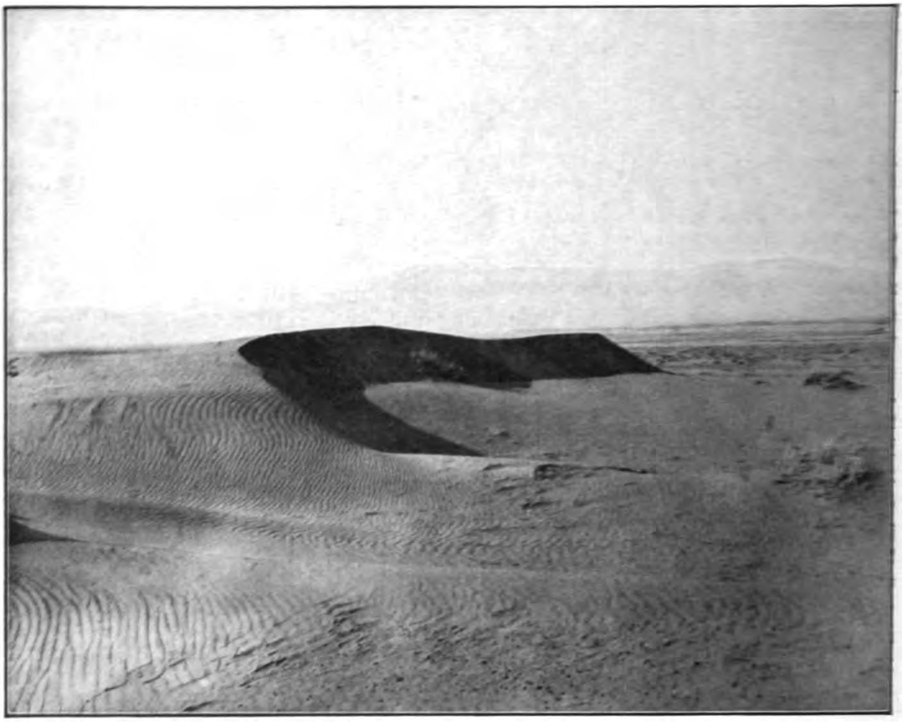
* Explorations in Turkestan, by Raphael Pumpelly, William M. Davis, and Ellsworth Huntington, with 174 illustrations and maps. Pp. 325, 9 x 12 inches. Washington, Carnegie Institution, 1905.



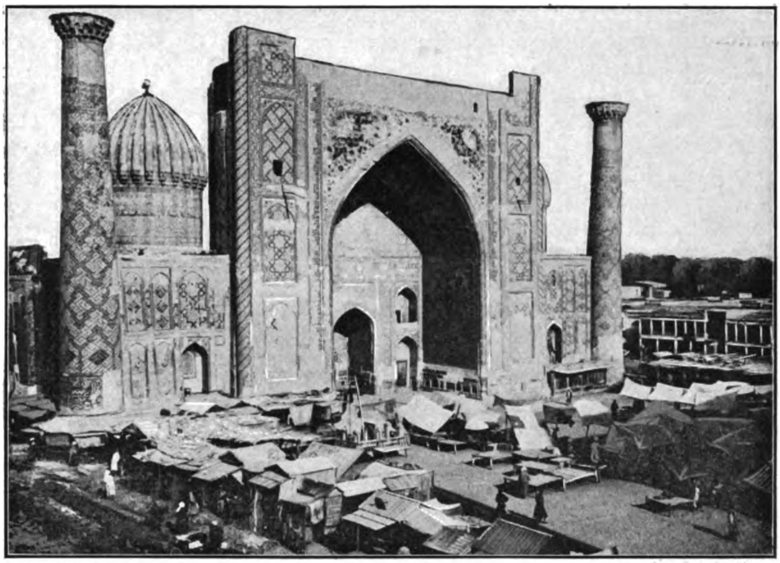
From Wm. M. Davis, Carnegie Institution

A Sand Dune Advancing Across the Desert

It had long seemed to me that a study of central Asian archeology would probably yield important evidence in the genealogy of the great civilizations and of several at least of the dominant races, and that a parallel study of the traces of physical changes during Quaternary time might show some coincidence between the phases of social evolution and the changes in environment; further, that it might be possible to correlate the physical and human records and thus furnish a contribution to the scale of recent geology.

While we have been surprised at the abundance of the data in natural and artificial records offered by the region toward these solutions, we are impressed with a realization of the intimate relation in which this region stands to the Quaternary and prehistoric history of the whole continent. Physically it forms part of the great interior region extending from the Mediterranean to Manchuria, whose history has been one of porgressive desiccation, but in Russian Turkestan the effects of this have been mitigated by the snows of the lofty ranges and the lower altitude of the plains.

Archeologically this region has, through a long period, been a center of production and commerce, connecting the eastern, western, and southern nations, and its accumulating wealth has made it repeatedly the prey of invading armies. It has been from remote time the field of contact and con-



From Wm. M. Davis, Carnegie Institution

A Mosque of Mediæval Samarkand

The ruins of Samarkand are very extensive. Its position must have made it an important center for commerce and wealth probably throughout the whole period of prehistoric occupation, as it has been during historic times. Situated in the heart of the very fertile oasis of the Zerafshan River, it lies also on the most open and easiest caravan routes connecting China and eastern Turkestan with Afghanistan, India, and Persia. Samarkand has, even within the past two thousand years, been sacked, destroyed, and rebuilt many times. Like Merv, its rebuildings have often been on adjoining sites, and the determining of the whole area covered by these various sites remains to be made. There is evidence that it is very extensive.

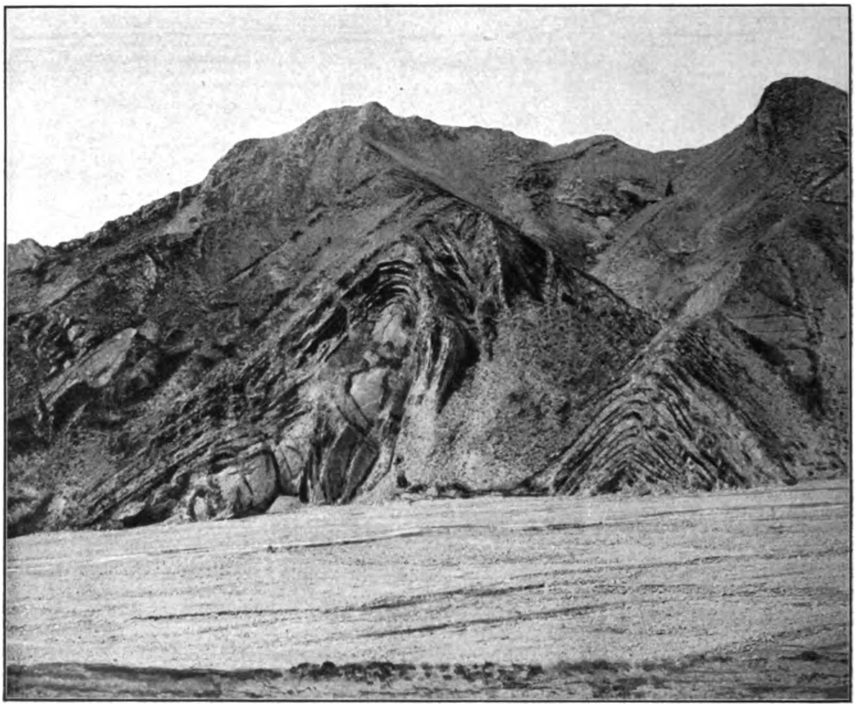
As in all Turkestan, so at Samarkand, the older structures still standing are those of the Mohammedan period. The many immense and wonderfully decorated mosques built by Tamerlane, though now falling into ruin, belong among the wonders of the world; and this not only on account of their great size, but also because of the beauty of their decoration. Seen from Afrosiab, these ruins tower high above the rich foliage of the oasis city—evidence of the wealth of treasure that Tamerlane had accumulated in Turkestan within two centuries after Genghis Khan had sacked the country and massacred much of the population.

test between the Turanian and Aryan stocks; but its problems, both physical and archeological, are parts of the greater problem underlying the study of the development of man and his civilization on the great continent and of the environment conditioning that development.

The many fragmentary peoples surviving in the remote corners and in the protected mountain fastnesses of Asia, preserving different languages, arts, and customs, indicate a very remote period of differentiation, with subsequent long periods for separate development. They point also to the long periods of unrest and battling in which the survivors of the vanquished were forced into their present refuges. And this unrest was probably the remote prototype of that which in the later prehistoric and historic time sent out its waves from the Aralo-Caspian basin. It was probably from the beginning a condition in which the slowly progressive change toward aridity in the interior Asia was ever forcing emigration outward, displacing other peoples, and thus working against the establishment of a stable equilibrium of population. Asia is thus the field for applying all the comparative sciences that relate to the history of man—the materials that lie in cave deposits, in rock pictographs, in tumuli, dolmens, and ruined towns, in languages, customs, religions, design patterns, and anthropological measurements.

Turkestan, from its geographical position, must have been the stage on which the drama of Asiatic life was epitomized through all these ages of ferment. Peoples and civilizations appeared and disappeared, leaving their records buried in ashes and earth; but the fertility of the soil produced wealth, and the position kept it ever a commercial center.

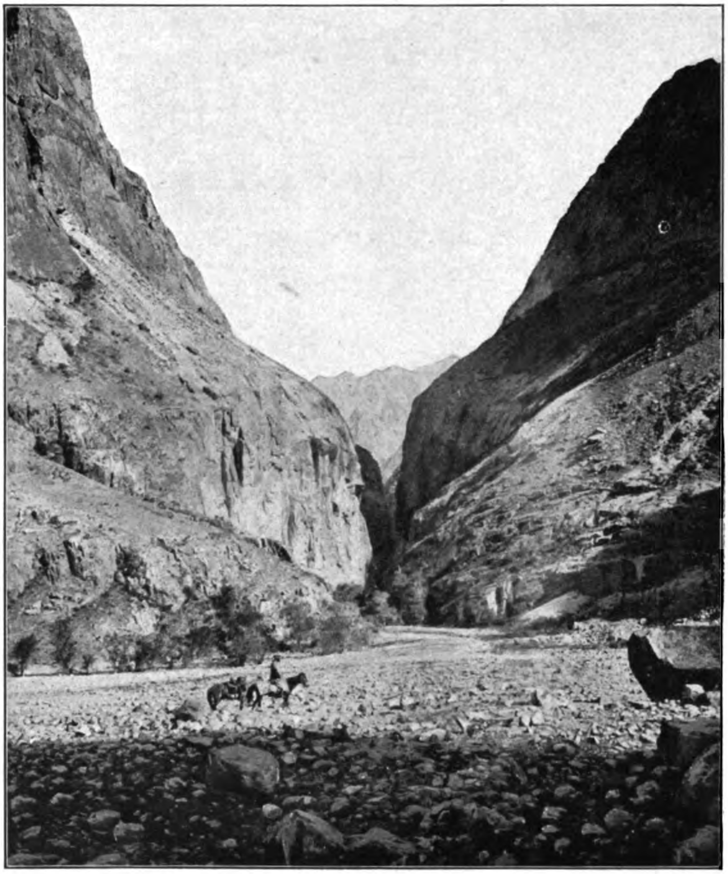
So far as our problems of archeology and physical geography are concerned, Turkestan is practically a virgin field. In geology and cartography the Russians have done a surprising amount of excellent work; but the modern methods of physico-geographic study have been only begun to be applied, and the little archeological work done there has been mostly in the nature of hunting curios and treasure, chiefly by foreigners, and in so destructive a manner that the Russian government has till now wisely prohibited excavations.



From Ellsworth Huntington, Carnegie Institution

Folds in the Limestone in the Sugun Valley west of Shor Kul, looking west

The thickness of made earth in the abandoned sites of Turkestan is sufficient to give reason for expecting evidences of very long-continued occupation. The dryness of the climate makes possible the preservation of any traces of written or incised documents that may have existed. Excavation conducted with the idea that everything met with—the earth itself, the character, the position, and association of fragments—is part of history cannot fail to be most fruitful in results.



From Ellsworth Huntington, Carnegie Institution

Limestone Gorge of the Western Kichik Alai

Where it enters the Ispairan River on the north side of the Alai Mountains. Probably the upper portion of the gorge was widened by a glacier, and the narrow slit at the bottom represents post-Glacial cutting. The main valley, from the side of which the photograph was taken, is clearly of glacial origin, and the side valley must have borne a hanging relation to that of the master stream.

We have shown that the recent physical history of the region is legibly recorded in glacial sculpture and moraines, in orogenic movements, in valley-cutting and terracing, in lake expansions, and

The Kirghiz in the Alai Valley

in the building up of the plains, and we have made some progress in correlating these events.

We have also found full confirmation of the statements as to a progressive desiccation of the region of long standing which has from a remote period continually converted cultivable lands into deserts and buried cities in sand.

We have found widely distributed great and small abandoned sites of human occupation with evidences of great antiquity.

We have reason to think that a correlation of these physical and human events may be obtained through continuance of the investigation, and that archeological excavations will throw light on the origin of Western and Eastern civilizations.

PROPORTION OF CHILDREN IN THE UNITED STATES

MANY interesting suggestions as to the probable tendency of the birth rate in the United States are offered in a bulletin by Walter F. Willcox entitled "Proportion of Children in the United States," recently published by the Bureau of the Census.

At the beginning of the nineteenth century the children under 10 years of age constituted one-third and at the end less than one-fourth of the total population. The decrease in this proportion began as early as the decade 1810 to 1820, and continued uninterruptedly, though at varying rates, in each successive decade. This of itself, however, is not enough to prove a declining birth rate, as the decrease in the proportion of children in the total population may indicate merely an increase in the average duration of life and the consequent survival of a larger number of adults.

But by taking the proportion of children to women of child-bearing age we are able to get a more satisfactory index of the movement of the birth rate. Between 1850 and 1860, the earliest decade for which figures can be obtained, this proportion increased. But since 1860 it has decreased without interruption. The decrease has been very unequal from decade to decade, but if twenty-year periods are considered, it has been very regular. In 1860 the number of children under 5 years of age to 1,000 women 15 to 49 years of age was 634; in 1900 it was only 474. In other words, the proportion of children to potential mothers in 1900 was only three-fourths as large as in 1860. One is thus led to the conclusion that there has been a persistent decline in the birth rate since 1860.

No attempt is made by the author of the bulletin to determine the probable causes of this decline. An extended argument by Gen. Francis A. Walker is given, suggesting that it is largely due to the influx of foreigners and the resultant shock to the population instinct of the natives. Professor Willcox does not express a definite opinion, claiming that the vital statistics of the United States are not sufficiently developed to afford a sound basis of judgment. He notes, however, that there has been a similar marked decline in the birth rate of Australia, where there has been no such torrent of immigration.

DECLINE GREATEST IN NORTH AND WEST

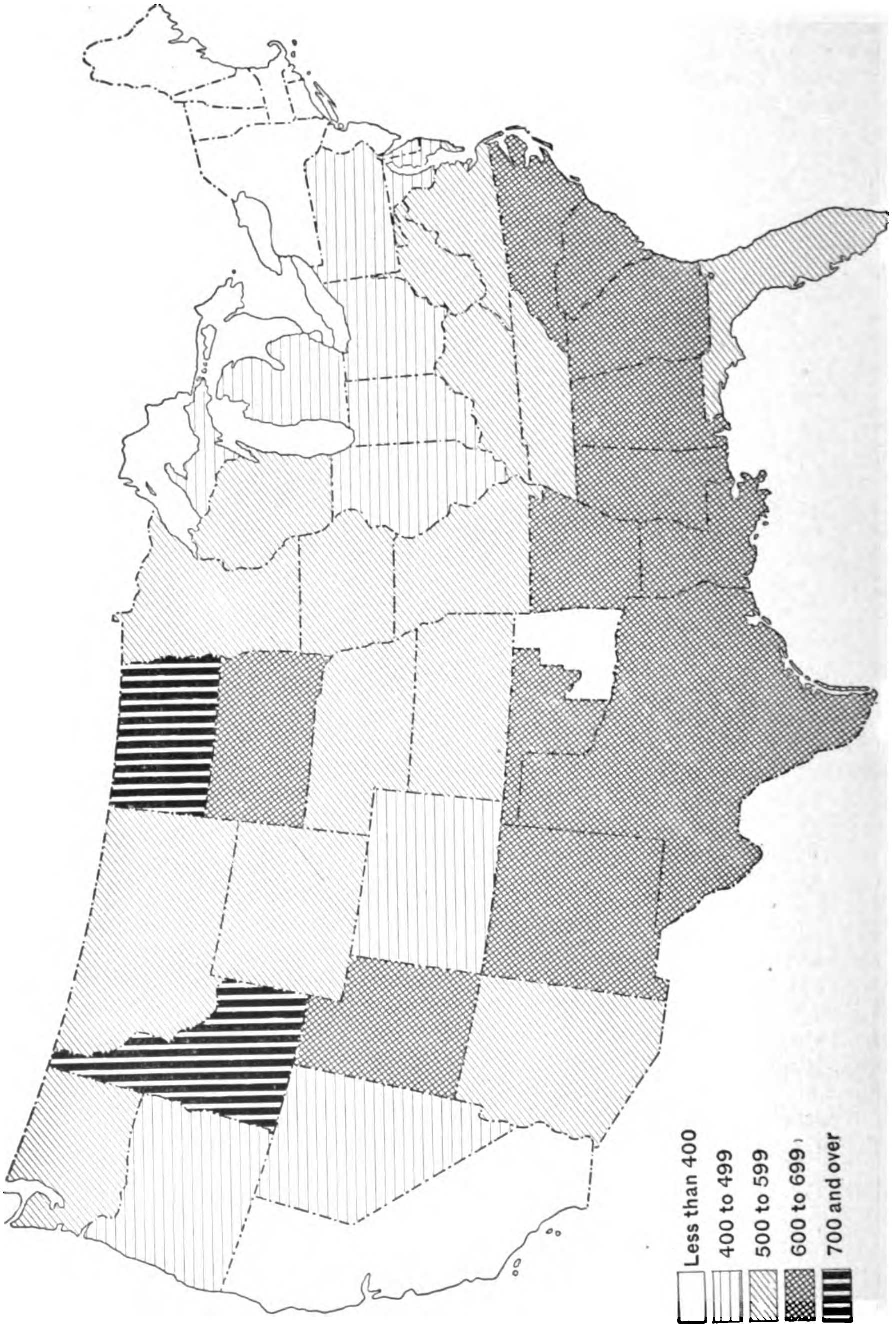
If this decline were due in large part to the influx of immigrants, we should expect it to be greatest in those sections of the country to which most of the immigrants have gone—greater in the North and West than in the South. It is found, in fact, that in the North and West there has been a more or less regular decline, while in the South the change has been less regular and the decline less marked. In 1850 the proportion of children to 1,000 women in the North and West was five-sixths of what it was in the South; in 1900 it was less than three-fourths.

In 1900 the smallest proportion of children was in the District of Columbia, where the number of children under 5 was hardly more than one-fourth the number of women of child-bearing age. But from the sociological standpoint the District of Columbia should be classed with cities rather than with states and territories. The next smallest proportion was that for Massachusetts, where it was slightly more than one-third. The largest proportion was in North Dakota and Indian Territory, in each of which it was two-thirds.

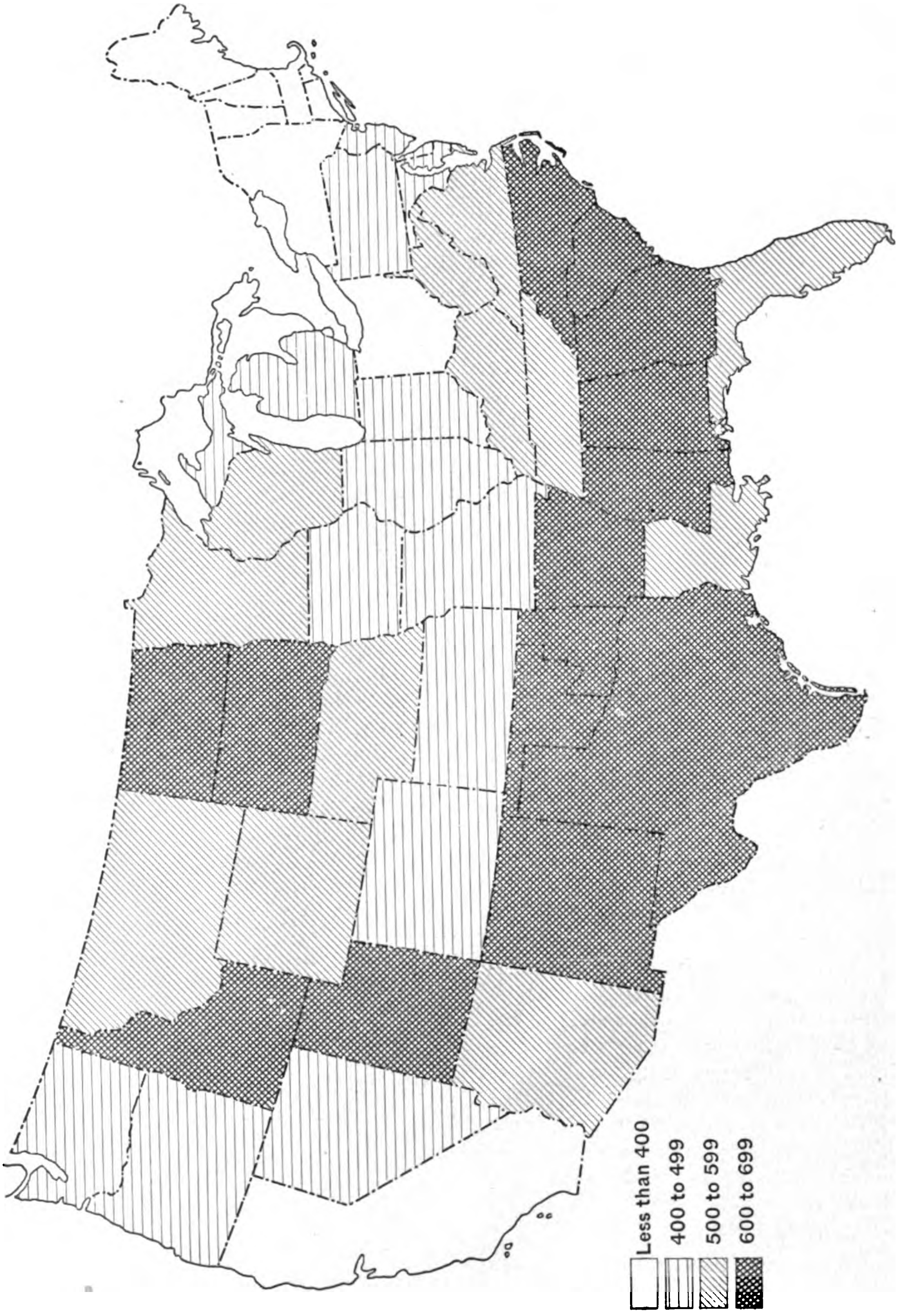
There was an unusual decrease in the proportion of children between 1860 and 1870, which must be attributed to the direct and indirect results of the civil war.

PROPORTION OF CHILDREN AMONG WHITES

The decrease in the proportion of white children under 10 to the total white population began as early as the decade 1810 to 1820, and has continued without interruption, but with varying rapidity, to the end of the century. The greatest decreases were found in the decades of greatest immigration, and may have been due in part to the disproportionate number of adults in the new immigrant population. The decreases in the decades 1850 to 1860 and 1890 to 1900 were very slight. The fact that these were the decades immediately following the great waves of immigration suggests that the check in


Less than 400
400 to 499
500 to 599
600 to 699
700 and over

Number of Children under 5 Years of Age to 1,000 Females 15 to 49 Years of Age: 1890


Less than 400
400 to 499
500 to 599
600 to 699

Number of Children under 5 Years of Age to 1,000 Females 15 to 49 Years of Age: 1900 the decrease was due to the large number of children born to the immigrants after they found homes and became settled.

PROPORTION OF CHILDREN AMONG NEGROES

The figures for negroes are not given separately, but are included with those for Indians and Mongolians. The negroes, however, constitute so large a proportion of the total that we are justified, in most cases at least, in accepting these figures as representing conditions among negroes. In the last twenty years the decline in the proportion of negro children has been especially rapid. The proportion of children among negroes was greater than that among whites at every census except that of 1870.

PROPORTION OF CHILDREN GREATER IN COUNTRY DISTRICTS THAN IN CITIES

In 1900, for the United States as a whole, the proportion of children was only two-thirds as great in cities as in the country districts. In the North Atlantic division, however, it was almost as great in the cities as in the country. In the Southern divisions it is hardly more than half as large in the cities as in the country, while in the Far West the difference is intermediate in amount. "This is probably due in large measure to the fact that the immigrant population who have been swarming into the northern cities of recent years, especially into the cities of the North Atlantic states, have been multiplying by numerous births with much rapidity, while the corresponding laboring class which has immigrated to southern cities from the surrounding country districts has not been thus increasing."

GREATER FECUNDITY OF FOREIGN-BORN WOMEN

A comparison is made between the proportion of children born of native mothers to 1,000 native women of child-bearing age and the proportion of children born of foreign-born mothers to 1,000 foreign-born women of child-bearing age. In 1900 the former proportion was 462, the latter 710, the difference indicating the greater fecundity of foreign-born women. The comparison also indicates that the total decrease in fecundity of white women between 1890 and 1900 was the result of a decrease for native white women partly offset by an increase for foreign-born white women.

KETCHIKAN

THE thriving town of Ketchikan is the first call port of all the American steamers which follow the inland passages between Puget Sound and Alaska. Owing to this fact and its growing importance as a mining center, it will doubtless soon be included among the towns which are connected with the government cable system, but at present it is dependent on its postal facilities for communication with the rest of the world.

The photograph which we publish was taken last summer, and shows in the center of the picture its pride, the public school-house on the hill. The town is about fifty miles north of the boundary and is situated on Revillagigedo Island, on the north side of Tongass Narrows.

What effect the establishment of the trans-Pacific terminal of the Grand Trunk Railroad near Port Simpson will have on Ketchikan cannot be foretold, but in all probability it will serve to increase its importance.

O. H. T.

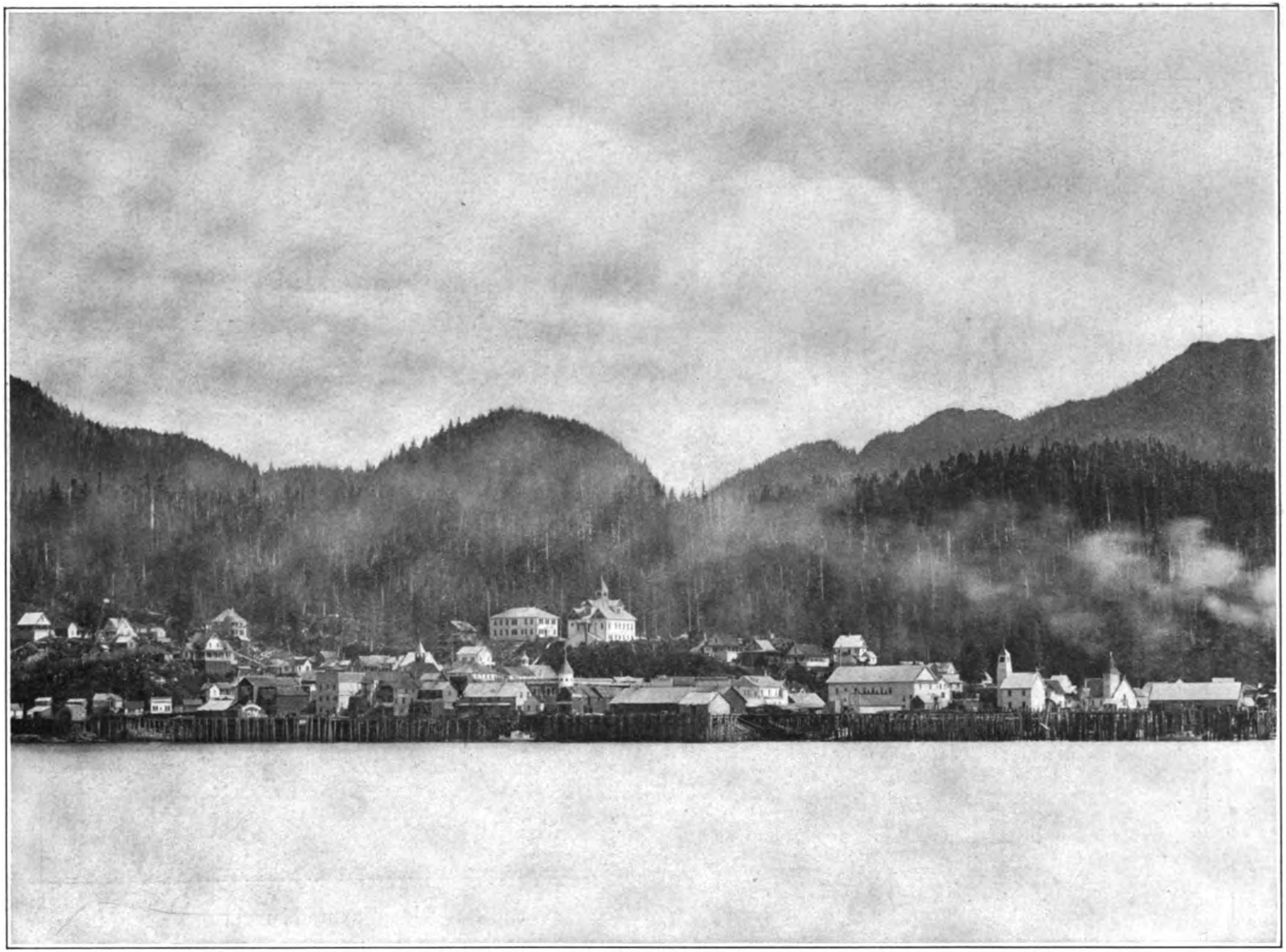
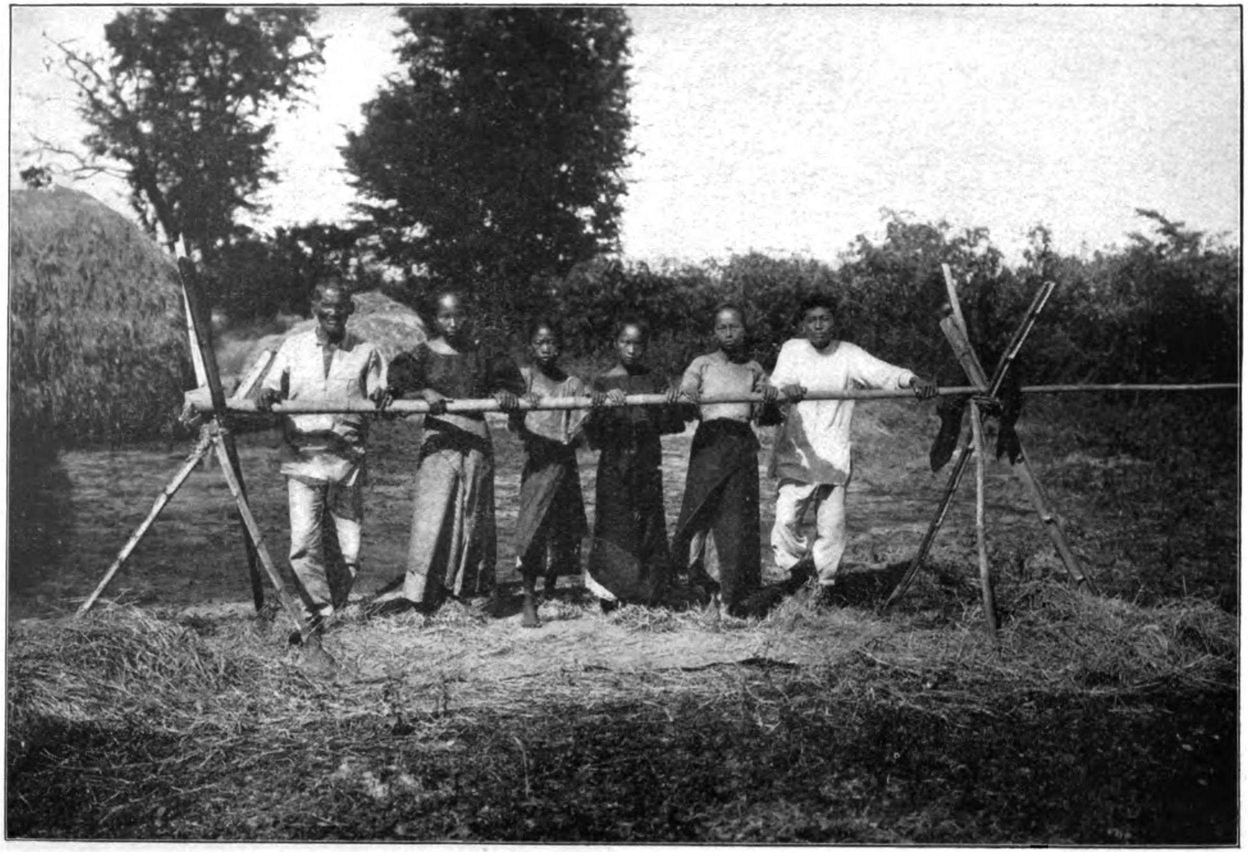


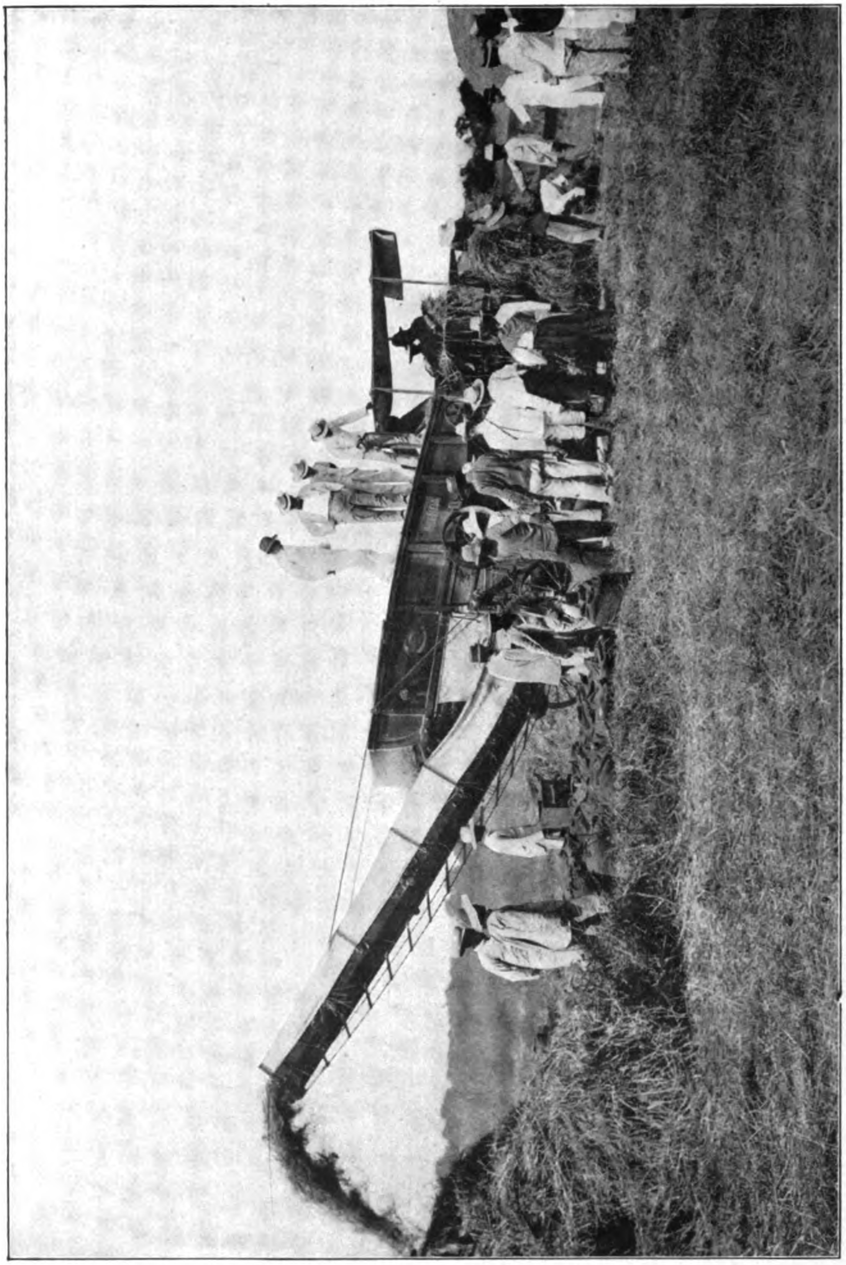
Photo by O. M. Leland, U. S. Coast and Geodetic Survey

The Town of Ketchikan, Alaska, in the Spring of 1905

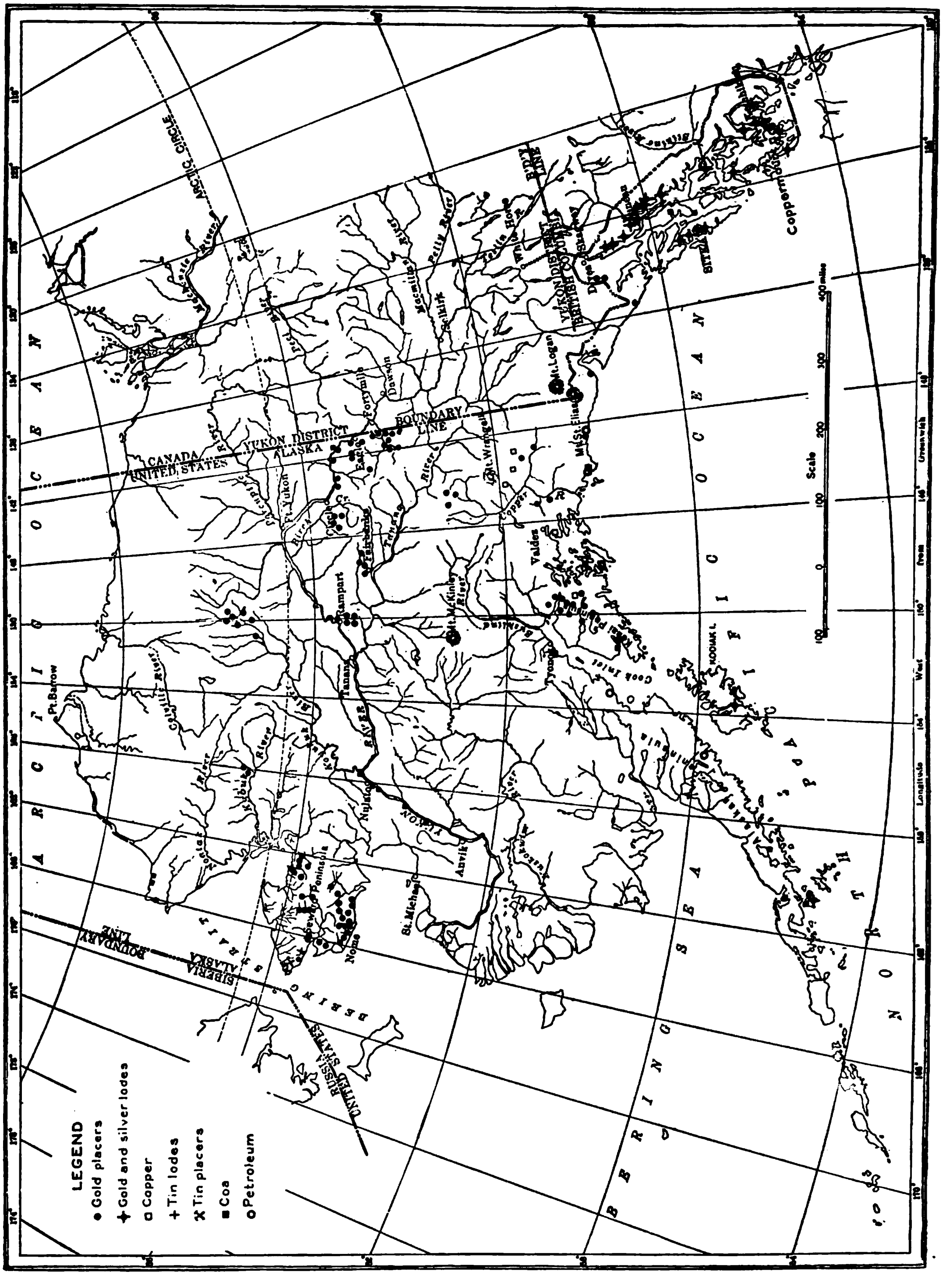


Philippine Method of Threshing Rice, Government Rice Farm, Murcia

Treading out the grain (see page 514)



Threshing Rice with American Machinery, Government Rice Farm, Murcia


LEGEND
● Gold placers
✚ Gold and silver lodes
□ Copper
+ Tin lodes
ẋ Tin placers
■ Coa
○ Petroleum
ARCTIC OCEAN
PACIFIC OCEAN
BERING SEA
BERING STRAIT
ARCTIC CIRCLE
CANADA
UNITED STATES
YUKON DISTRICT
ALASKA
BOUNDARY LINE
YUKON DISTRICT
BRITISH COLUMBIA
SIBERIA
ALASKA
BOUNDARY LINE
RUSSIA
UNITED STATES
Pt. Barrow
Colville River
Kobuk River
Noatak River
Seward Peninsula
Nome
St. Michael
Anvik
Nulato
Tanana
Rampart
Fairbanks
Circle
Ft. Yukon
Eagle
Fortymile
Dawson
Selkirk
Pelly River
Macmillan River
White R.
Teslin Horse
Mackenzie River
Peel River
Porcupine River
Tanana River
Yukon River
Mt. McKinley
Copper River
Mt. Wrangell
Mt. Logan
Mt. St. Elias
Valdez
Cook Inlet
Kodiak I.
Sitka
Copper Mt.
Scale
0 100 200 300 400 miles
Longitude West from Greenwich

Map of Alaska, showing Mineral Deposits so far as known

From Alfred H. Brooks, U. S. Geological Survey

THE RETURNS FROM ALASKA

WE are getting more gold out of Alaska each year than the territory cost us in 1867. In 1904 $9,000,000 of the yellow metal were shipped to the United States from Alaska. Of this sum $6,000,000 were from placer deposits and the balance from lode deposits. Big as is the present output from the gold placers, Mr Alfred H. Brooks, of the Geological Survey, estimates that the amount will be doubled in a few years. The Cape Nome fields are still in the lead, but the Fairbanks district is being developed very rapidly.

The great need of the territory at the present time is some roads. There are not more than 50 miles of road in Alaska, and these were built by private enterprise. The expenditure of $1,000,000 in constructing a few trunk lines would be many times repaid in increased gold production. Many of the fields cannot now be worked profitably because of the cost of transporting machinery and provisions.

A hundred feet of 8-inch 16-gage hydraulic riveted steel pipe costs in Fairbanks $175. On Fairbanks Creek, 20 miles away, the same 100 feet of pipe, with freight at 20 cents per pound, costs, if transported in summer, $301, representing a freight charge of $126. In the Klondike, where the topography is nearly the same, the same pipe would be landed on a claim 20 miles from Dawson for a freight charge of $9.45.*

Already over 300 miles of wagon road have been built by the Canadian government in the Yukon territory and the Atlin district of British Columbia, while over 600 miles of sled roads have been made in the Yukon territory. The fact that in the summer wagons and vehicles of all descriptions, and even bicycles, may be seen daily about Dawson, the Klondike creeks, and Atlin, in British Columbia, while the winter roads in Canadian territory afford continuous easy routes for horse sleds down the Yukon to Dawson, is evidence of the success of the Canadian road-building enterprise.

Four important reports on the mineral resources of Alaska have been recently published by the U. S. Geological Survey: "Mineral Resources in Alaska in 1904" (Bulletin 259), by Alfred H. Brooks, C. W. Purington, F. E. and C. W. Wright, Arthur C. Spencer, Arthur J. Collier, George C. Martin, L. M. Prindle, and Ralph W. Stone. The bulletin describes progress in developing the gold, coal, petroleum, and tin resources. "Fairhaven Gold Placers, Seward Peninsula" (Bulletin 247), by Fred H. Moffit, with two large new maps (one geologic and one topographic) of northeastern portion of Seward Peninsula. "Gold Placers of Forty-Mile, Birch Creek, and Fairbanks Regions" (Bulletin 251), by Louis M. Prindle, with a reconnaissance map of the Yukon Tanana region. "Methods and Costs of Gravel and Placer Mining in Alaska" (Bulletin 263), by C. W. Purington.

PROGRESS IN THE PHILIPPINES

THE Report of the Philippine Commission for 1904, which has just been published by the War Department in three volumes, gives an interesting account of the operations of a steam rice-thrasher which the insular government installed on the experimental farm in 1904. During the rice season the thrasher covered 125 miles and proved so popular that, in spite of the moderate toll charged, nearly $500 were cleared after paying all operating expenses. The natives obtained so much more grain by steam-thrashing that some of the ignorant thought that there was a devil in the machine, or that there must be some trickery in its operation.

The people in tramping out rice with

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* "Gravel and Placer Mining in Alaska," C. W. Purington, Bull. 263, U. S. Geological Survey, Washington, 1905, p. 227.

their feet or driving carabaos (see illustrations, pages 510–511) over it as a means of thrashing it, generally occupy the best part of three months in the work and suffer losses of rice in waste, stealage, leakage, etc., of 25 per cent of the entire crop. They thrash the crop so slowly in fact that in many cases they eat it up as fast as they thrash it. Their methods of hulling and cleaning are equally crude, and the valuable by-products, as well as much of the rice, are wasted. By thrashing the crop by steam-power the rice becomes a marketable commodity at once, and the farmer and his laborers have time to put in other crops. Several steam-thrashing outfits have been ordered by Filipinos.

"One curious trait of the Filipino," says Mr W. C. Welborn, chief of the Bureau of Agriculture, "seems to be that he is willing to buy what he has actually seen to be good; but one need not talk about any improvement or addition to what he has not seen. He will believe none of it, and wants what he has seen demonstrated—no more and no less. It is often charged that the Filipino will not work, and hence will never develop the country. I believe he now expends enough energy (largely unprofitably spent, carrying heavy burdens long distances, tramping out rice, cleaning it in mortars, and doing all manner of hard work in the crudest way) to make the country a garden if properly directed."

Some of the developments of the year were (1) improvements in the parks, buildings, and sanitation of Manila; (2) continued work on the harbor system, which when completed will enable Manila to "offer to the shipping of the world a safe and commodious harbor, with a minimum depth of 33 feet, which will undoubtedly be the best in the Orient;" (3) the completion of the Benguet road to the Bagino sanitary resort; (4) useful experiments in the introduction of American cattle, and improved and new varieties of agricultural products.

WE OCCUPY THE BEST POSITION ON THE MAP

A few paragraphs from the address of the Secretary of the Treasury, Hon. Leslie M. Shaw, to the American Bankers' Convention, Washington, October 11, 1905.

We point with pride to our export trade of a billion and a half, and with our thumbs in the armholes of our waistcoats we contemplate our skill and foresight and our ability as international merchants.

Of our aggregate exports about $1,000,000,000 consists of raw cotton, food products, petroleum products, crude copper, lumber, and other raw materials and crude articles, of which we produce a surplus which the world not only needs, but must have.

The time is coming, gentlemen—with our increasing population more largely urban than ever, with factories multiplying more rapidly than farms, with limitless manufacturing resources and matchless aptitude for production—when the United States will need new and important markets. The world may come to us in its own ships for the products of our farms and the raw products of our mines, but it will not come in its own ships for the finished products of our factories. The time is coming when we will need international bankers and international merchants and an international merchant marine.

We occupy the best position on the map. We have the safest and most convenient form of money in the world. We speak the language of commerce. Our farms produce more than the farms of any other country. Our mines yield more gold literally by the carload, silver by the train load, and there is unloaded on the shores of a single commonwealth more iron ore than any other country produces. Our forests yield 100,000,000 feet of lumber for every day of the calendar year. Our factories turn out more finished products than all the factories of Great Britain and Germany combined by more than three thousand millions every twelve months. We transport this matchless product of farm and factory, forest and mine, from the interior to the sea at one-third what similar services cost anywhere else beneath the skies. We carry it from point to point along the coast in better vessels, on quicker time, and at cheaper rates than others.

But at our coast line we are brought to an abrupt halt. Here we are no longer independent. Our foreign commerce is four times as large as forty years ago, but we carry in our own ships only one-third as many gross tons as forty years ago. We have protected and encouraged every interest but our merchant marine, and every protected interest has flourished. We have every facility for international commerce except international merchants, international bankers, and an international merchant marine. Shall we not have these? I am not urging ship subsidies. I am speaking of results, not of methods. If we will but take advantage of our opportunities, we will send these products of farm and factory under every sky and into every port, and make our financial centers the clearing houses of at least a fraction of the world's trade.

FORESTS VITAL TO OUR WELFARE

From an Address by President Roosevelt at Raleigh, N. C., October 19, 1905

AND now I want to say a word to you on a special subject in which all the country is concerned, but in which North Carolina has a special concern. The preservation of the forests is vital to the welfare of every country. China and the Mediterranean countries offer examples of the terrible effect of deforestation upon the physical geography, and therefore ultimately upon the national well-being of the nations. One of the most obvious duties which our generation owes to the generations that are to come after us is to preserve the existing forests. The prime difference between civilized and uncivilized peoples is that in civilized peoples each generation works not only for its own well-being, but for the well-being of the generations yet unborn, and if we permit the natural resources of this land to be destroyed so that we hand over to our children a heritage diminished in value, we thereby prove our unfitness to stand in the forefront of civilized peoples. One of the greatest of these heritages is our forest wealth. It is the upper altitudes of the forested mountains that are most valuable to the nation as a whole, especially because of their effects upon the water-supply. Neither state nor nation can afford to turn these mountains over to the unrestrained greed of those who would exploit them at the expense of the future.

We cannot afford to wait longer before assuming control, in the interest of the public, of these forests; for if we do wait the vested interests of private parties in them may become so strongly intrenched that it may be a most serious as well as a most expensive task to oust them.

If the Eastern states are wise, then from the Bay of Fundy to the Gulf we will see within the next few years a policy set on foot similar to that so fortunately carried out in the high Sierras of the West by the national government. All the higher Appalachians should be reserved, either by the states or by the nation. I much prefer that they should be put under national control, but it is a mere truism to say that they will not be reserved either by the states or by the nation unless you people of the South show a strong interest therein.

Such reserves would be a paying investment, not only in protection to many interests, but in dollars and cents to the government. The importance to the

Southern people of protecting the Southern mountain forests is obvious. These forests are the best defense against the floods which in the recent past have, during a single twelve-month, destroyed property officially valued at nearly twice what it would cost to buy the Southern Appalachian reserve. The maintenance of your Southern water powers is not less important than the prevention of floods, because if they are injured your manufacturing interests will suffer with them. The perpetuation of your forests, which have done so much for the South, should be one of the first objects of your public men. The two Senators from North Carolina have taken an honorable part in this movement. But I do not think that the people of North Carolina or of any other Southern state have quite grasped the importance of this movement to the commercial development and prosperity of the South.

COTTON AND THE CHINESE BOYCOTT

From an address by President Roosevelt to the citizens of Atlanta, October 20, 1905

I AM glad to see diversifications of industry in the South, the growth of manufactures as well as the growth of agriculture, and the growing growth of diversification of crops in agriculture. Nevertheless it will always be true that in certain of the Southern States cotton will be the basis of the wealth, the mainstay of prosperity, in the future as in the past. The cotton crop is of enormous consequence to the entire country. It was the cotton crop of the South that brought $400,000,000 of foreign gold into the United States last year, turning the balance of trade in our favor. The soil and climate of the South are such that she enjoys a practical monopoly in the production of raw cotton. Under proper methods of distribution, it may well be doubted whether there can be such a thing as overproduction of cotton. Last year's crop was nearly fourteen million bales, and yet the price was sufficiently high to give a handsome profit to the planter. The consumption of cotton increases each year, and new uses are found for it.

At present our market for cotton is largely in China. The boycott of our goods in China during the past year was especially injurious to the cotton manufacturers. This government is doing, and will continue to do, all it can to put a stop to the boycott. But there is one measure to be taken toward this end in which I shall need the assistance of the Congress. We must insist firmly on our rights, and China must beware of persisting in a course of conduct to which we cannot honorably submit; but we in our turn must recognize our duties exactly as we insist upon our rights. We cannot go into the international court of equity unless we go in with clean hands. We cannot expect China to do us justice unless we do China justice. The chief cause in bringing about the boycott of our goods in China was undoubtedly our attitude toward the Chinese who come to this country. This attitude of ours does not justify the action of the Chinese in the boycott, and especially some of the forms which that action has taken. But the fact remains that in the past we have come short of our duty toward the people of China.

It is our clear duty, in the interest of our own wage-workers, to forbid all Chinese of the coolie class—that is, laborers, skilled or unskilled—from coming here. The greatest of all duties is national self-preservation, and the most important step in national self-preservation is to preserve in every way the well-being of the wage-worker. I am convinced that the well-being of our wage-workers demands the exclusion of the Chinese coolies, and it is therefore our duty to exclude them, just as it would be the duty of China to exclude American laboring men if they became in any way a menace to China by entering her country. The right is reciprocal, and in our last treaty with China it was explicitly recognized as inhering in both nations.

But we should not only operate the law with as little harshness as possible, but we should show every courtesy and consideration and every encouragement to all Chinese who are not of the laboring class to come to this country. Every Chinese traveler or student, business man or professional man should be given the same right of entry to, and the same courteous treatment in, this country as are accorded to the student or traveler, the business man or professional man of any other nation. Our laws and treaties should be so framed as to guarantee to all Chinamen, save of the excepted coolie class, the same right of entry to this country and the same treatment while here as is guaranteed to citizens of any other nation. It is needed in our own interest, and especially in the interest of the Pacific slope and of the South Atlantic and Gulf states; for it is shortsighted indeed for us to permit foreign competitors to drive us from the great markets of China.

IMMIGRATION TO THE SOUTHERN STATES*

IN recent years, especially within the last ten, there has been a gradual but marked change of sentiment in the South in regard to the desirability of immigration. The South now wants it and is working hard to get it. The resources of the South have scarcely been touched, and under the most favorable circumstances it will require many generations to develop them. There are millions of acres of cotton, cane, rice, and tobacco lands that have never been cultivated. Louisiana alone has 19,000,000 acres of vacant land out of a total of 26,000,000; and it is estimated that not more than one-eighth of the cotton lands of the South are in cultivation. The mineral resources of the South are almost unlimited; it has more timber than any other section of the United States; in every Southern state there is water power never yet used, and there are ideal situations for market-gardening on the largest scale.

The negro cannot furnish either in quality or in quantity the labor necessary to develop the South. The progress of the South since the war has been almost wholly in the white districts.

Florida sends out lists of state lands, maps of the attractive portions of the state, and beautifully illustrated pamphlets relating to cattle-raising, lumbering, fruit and truck growing, fish and game, and winter resorts. Louisiana publishes free information concerning the climate, soil, resources, industries, schools, and churches, and sends out lists with descriptions and prices of 6,000,000 acres of land for sale. The other Southern states follow much the same methods. Most of the states have representatives in New York and in the West, whose business it is to disseminate information and secure immigration. The state immigration bureaus have had fair success.

Louisiana has probably secured the best results. The authorities confine their work principally in the middle West, aiming to attract substantial farmers rather than laborers. Since 1900 many Northern farmers have settled in Louisiana. In New Orleans, however, the work of the negro roustabouts, who loaded and unloaded the steamers at the wharves, became so unsatisfactory that whites from the West were brought in to supplant them. South Carolina has secured several settlements of Scotch, Canadians, and Germans, and is now trying to secure Scandinavians. Maryland secured 4,000 very desirable immigrants in one year at an expense of only $15,000.

The state authorities have been greatly aided by hundreds of immigration and development societies. Every commercial and industrial body acts also as an immigration society. In Louisiana alone there are more than one hundred; one of them has 7,000 acres of land for sale. The "colony" plan has also brought desirable immigrants to the South.

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*A summary of an extremely interesting study by Prof. Walter L. Fleming, of the University of West Virginia, published by Ginn & Co.

But the most potent factors in the immigration movement are the railroads. Each important railroad company has hundreds of thousands of acres of land for sale and wishes to see industries developed along its lines. Until within the last few years the North and South lines have not offered special rates to homeseekers except in colonies. Now, on the first and third Tuesdays in each month special homeseekers' rates are offered on every road east of the Rockies that runs into the South or the Southwest. These excursions have proved a great success. The Union station at St Louis is crowded every other Tuesday with men from the Northwest bound to the South and Southwest. On the night of September 15, 1903, the Iron Mountain road carried out of St Louis within two hours six special trains with three thousand homeseekers.

The South does not want the lower class foreigners who have swarmed into the Northern states; it wants the same sort of people who settled so much of the West. The newcomers from the Western states and from western Europe are not mere laborers. They work for themselves on their own holdings. In those parts of the South, however where unskilled labor is wanted to supplement the work of the blacks, such immigration will not solve the problem. One planter complained that he had land sufficient to produce 1,000 bales of cotton, but labor enough for only 300. He thought that the exclusion laws could be repealed if the Southern states should advocate the policy. It is certain, however, that the South will not tolerate the introduction of large numbers of Chinese, for fear of possible race complications.

The solution seems to be to induce the Italians to come in as farm laborers, with the prospect of becoming landowners on a small scale. They have come in larger numbers than other foreigners, and, much to the surprise of all, they have proved successful farmers on the cotton and sugar plantations. The great lumbering companies also are employing them. The north Italian is preferred, but the principal immigration is from southern Italy, Sicily, and the old Papal states. The numbers are constantly increasing. In Louisiana in 1900 there were 17,000 Italians; in 1904 there were 30,000. In 1904 it was estimated that more than 100,000 Italian farm laborers were working in the Southern states of the Mississippi Valley. Numbers come from Sicily or from the North to work during the cane-cutting season, and then return to the North or to Sicily. Between New Orleans and Baton Rouge the Italian laborer has largely displaced the negro, and the same is true of many other localities.

At Independence, Louisiana, in 1904, 275 car-loads of strawberries, valued at $500,000, were produced by Italian laborers. These colonists have begun to purchase little farms, have good homes, and money in the bank. The younger ones do not expect to return to Italy. A tract of 1,600 acres of land in this community sold, in 1879, for $1,600; in 1904, 200 acres of the same tract sold for $10,400. In the same community other pieces of the land have risen in value from $1 to $50 per acre within two years. Many planters have substituted Italians for negroes as tenants. The former are not criminal, are prompt to pay debts, and have improved morally as well as materially since they arrived in America.

In conclusion, it may be said that immigration to the South seldom reaches the black belt. There seems to be a dislike of contact with the negro.

Where newcomers enter the black belt they go in colonies, settle near the railroad, and dispense with the negro. Much of the immigration does not increase the population of a community; it simply displaces the negro. Compared with the great volume of immigration to the West and North, the numbers that go South are insignificant; but compared with the numbers that went South ten years and more ago, the recent movement is very important. There is plenty of vacant land, and the Southerners say that if a million settlers have come and are satisfied, there is no reason why other millions may not come.

AN IMPORTANT GEOGRAPHIC PUBLICATION

THE report of the Eighth International Geographic Congress, which met in the United States in September, 1904, has just appeared from the Government Printing Office, and copies are now being distributed to the members of the Congress. The volume makes a book of 1065 pages, illustrated by maps, diagrams, and photographs, and contains 148 papers and abstracts contributed by geographers from all parts of the world. It is one of the most valuable additions to geographic knowledge published during recent years. The expense of publication has been paid by the United States government in accordance with an act of Congress passed March 3, 1905. A useful feature of the report is the arrangement of the proceedings by means of which any act of the Congress may be readily found. The arrangement is: History of the Congress, organization, with officers, committees, lists of members, of associate members, and of delegates and institutions represented, and a summary of membership and attendance, diary of the Congress, minutes of the general meetings, minutes of the meetings of the presidency, addresses, reports of committees and resolutions adopted, and papers. Ten of the papers included in the volume have been published in this magazine. The following titles show the wide range of subjects discussed in the report:

Scientific Exploration of Caves. Prof. E. A. Martel.

The Valleys and Lakes of the Alps. Dr Albrecht Penck.

The Geography of Alaska. Mr A. H. Brooks.

A Climatological Dictionary for the United States. Prof. A. J. Henry.

The Canadian Climate. Prof. R. F. Stupart.

Evidences of Land Near the North Pole. Prof. R. A. Harris.

Glacial Exploration in the Montana Rockies. Prof. L. W. Chaney.

Geographic Work of the U. S. Coast and Geodetic Survey. Messrs W. C. Hodgkins and G. R. Putnam.

Evidence in Favor of the Former Connection of Brazil and Africa. Prof. Charles C. Adams.

The Conditions of Man's Origin. Dr Leonidas Chalikiopoulós.

The Peoples of the Philippines. Mr Henry Gannett.

Africa Between the River Juba and the Nile. Dr A. Donaldson Smith.

A Comparative View of the Arctic and Antarctic. Dr Frederick A. Cook.

The Everglades of Florida. Rev. J. N. MacGonigle.

Geography of the Pan-American Railway. Charles M. Pepper.

Future Explorations in Australia. Prof. David Lindsay.

Maps: Handling, Classifying, Cataloguing. Thomas Letts.

Some Recent Governmental Influences upon the Geographic Conditions of Commerce. Prof. Emory R. Johnson.

Rise and Development of the German Colonial Possessions. Graf von Pfeil.

The Economic Importance of the Plateaus in Tropic America. Prof. J. R. Smith.

The Atlantic Ferry. Capt. D. J. Kennelly.

The Caribbean Sea Regions and Their Resources. Francis C. Nichols.

A Plea for the Establishment of a Commercial Game and Fur Preserve in the Northwest. Dr Townsend W. Thorndike.

Geography and History in the United States. Prof. Albert P. Brigham.

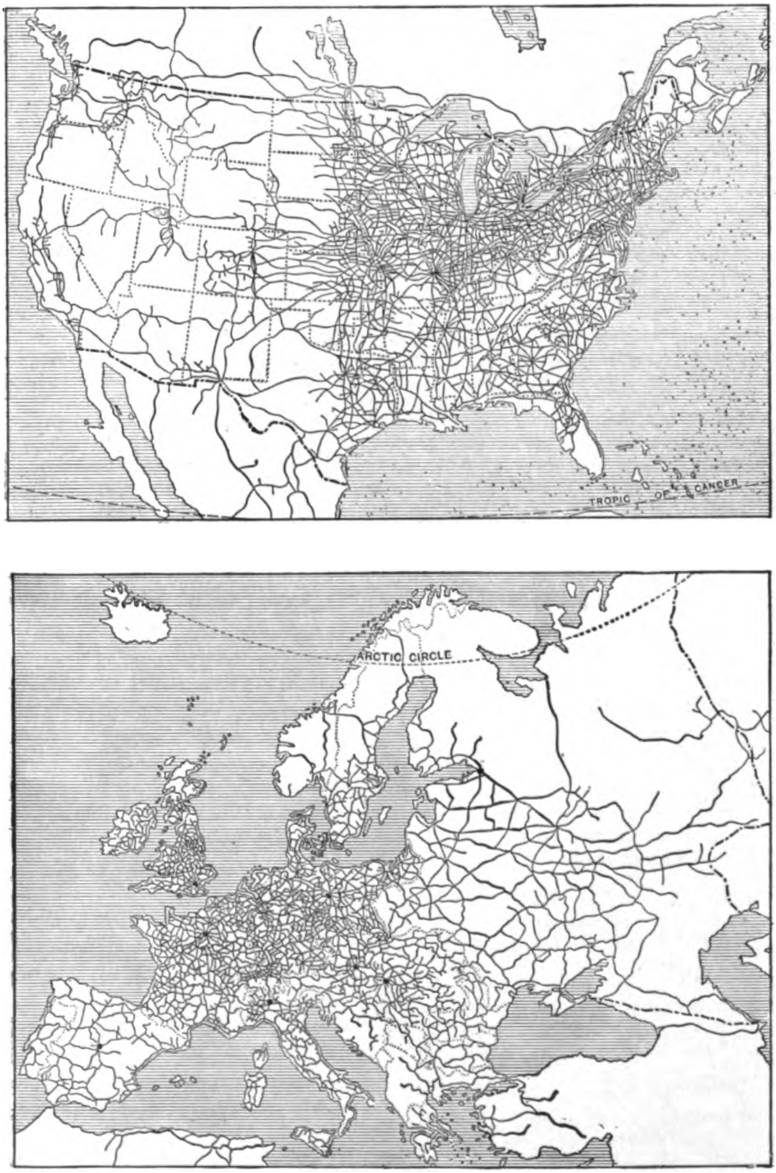
IRRIGATION REPORTS

THE following Water-Supply and Irrigation Papers have been issued recently by the U. S. Geological Survey. Of these 4,000 copies have been delivered to Senators and Representatives in Congress and 1,500 copies to the Survey for general distribution. Applications can be made for them either to members of Congress or to the Survey. Requests specifying certain papers and stating reasons for asking for them are granted whenever practicable, but it is impossible to comply with a general demand for all of the series, as no mailing list is maintained.

109. Hydrography of Susquehanna River Basin. J. C. Hoyt and R. H. Anderson.
110. Contributions to Hydrology of Eastern United States, 1904. M. L Fuller, Geologist in Charge.
111. Preliminary Report on Underground Waters of the State of Washington. Henry Landes.
112. Underflow Tests in Basin of Los Angeles River. Homer Hamlin.
113. The Disposal of Strawboard and Oil Wastes. R. L. Sackett and Isaiah Bowman.
114. Underground Waters of Eastern United States. M. L. Fuller, Geologist in Charge.
115. River Surveys and Profiles Made During 1903. W. C. Hall and J. C. Hoyt.
116. Water Problems of Santa Barbara, Cal. J. B. Lippincott.
117. The Lignite of North Dakota and Its Relation to Irrigation. F. A. Wilder.
118. Geology and Water Resources of a Portion of East-Central Washington. F. C. Calkins.
119. Index of Hydrographic Progress Reports of the U. S. Geological Survey. J. C. Hoyt and B. D. Wood.
120. Bibliographic Review and Index of Papers Relating to Underground Waters Published by the U. S. Geological Survey. M. L. Fuller.
121. Preliminary Report on the Pollution of Lake Champlain. M. O. Leighton.
122. Relation of the Law to Underground Waters. D. W. Johnson.
123. Geology and Underground Water Conditions of the Jornado del Muerto, New Mexico. C. R. Keyes.
124. Atlantic Coast of New England Drainage.
125. Hudson, Passaic, Raritan, and Delaware River Drainages.
126. Susquehanna, Patapsco, Potomac, James, Roanoke, Cape Fear, and Yadkin River Drainages.
127. Santee, Savannah, Ogeechee, and Altamaha Rivers, and Eastern Gulf of Mexico Drainages.
128. Eastern Mississippi River Drainage.
129. Great Lakes and St Lawrence River Drainage.
130. Hudson Bay, Minnesota, Wapsipinicon, Iowa, Des Moines, and Missouri River Drainages.
131. Platte, Kansas, Meramec, Arkansas, and Red River Drainages.
132. Western Gulf of Mexico Drainage.
133. Colorado River and the Great Basin Drainage.
134. The Great Basin and Pacific Ocean Drainages in California.
135. Columbia River and Puget Sound Drainage.
136. Underground Waters of Salt River Valley. W. T. Lee.
137. Development of Underground Waters in the Eastern Coastal Plain Region of Southern California W. C. Mendenhall.
138. Development of Underground Waters in the Central Coastal Plain Region of Southern California. W. C. Mendenhall.
139. Development of Underground Waters in the Western Coastal Plain Region of Southern California. W. C. Mendenhall.
140. Field Measurements of the Rate of Movement of Underground Water. C. S. Slichter.
141. Observations on the Ground Waters of Rio Grande Valley. C. S. Slichter.
142. Hydrology of San Bernardino Valley, California. W. C. Mendenhall.
143. Experiments on Steel-concrete Pipes. J. H. Quinton.
144. The Normal Distribution of Chlorine in the Natural Waters of New York and New England. D. D Jackson.
145. Contributions to the Hydrology of Eastern United States, M. L. Fuller, geologist in charge.
146. Proceedings of Second Reclamation Conference. Compiled by F. H. Newell.
147. Destructive Floods in the United States in 1904. E. C. Murphy and others.

Commercial Geography. By Henry Gannett, Carl Louise Garrison, and Edwin J. Houston. With maps and illustrations. Pp. 420. 5¾ x 8 inches. New York: American Book Company. 1905. $1.00.

Now that the exploration of the world is practically completed, and the acquisition of land by conquest is becoming more difficult each year, the struggle for commercial supremacy becomes principally a matter of education and training. Germany, realizing this fact some years


TROPIC OF CANCER
ARCTIC CIRCLE

From Gannett, Garrison, and Houston's "Commercial Geography"
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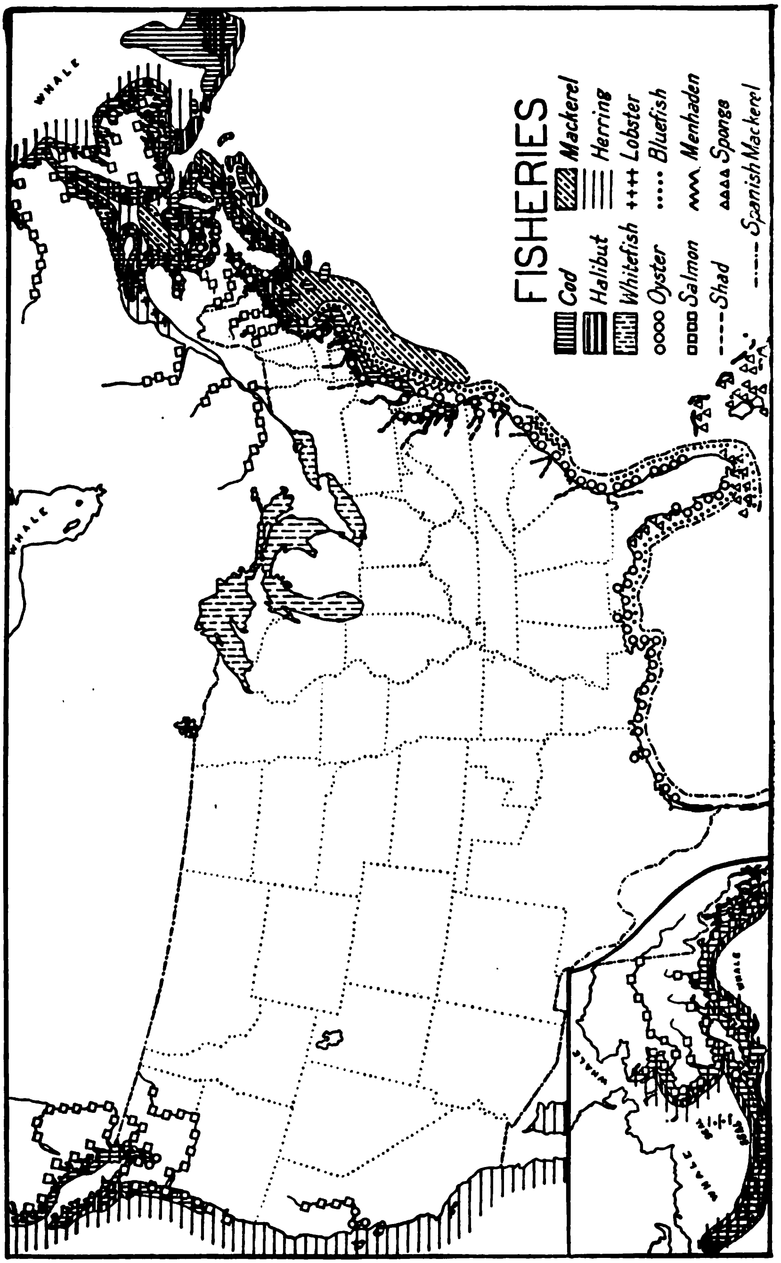
Relative Density of Railroads in United States and Europe.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Mackerel
Halibut
Herring
Whitefish
Lobster
Oyster
Bluefish
Salmon
Menhaden
Shad
Sponge
Spanish Mackerel
WHALE
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From Gannett, Garrison, and Houston's "Commercial Geography"
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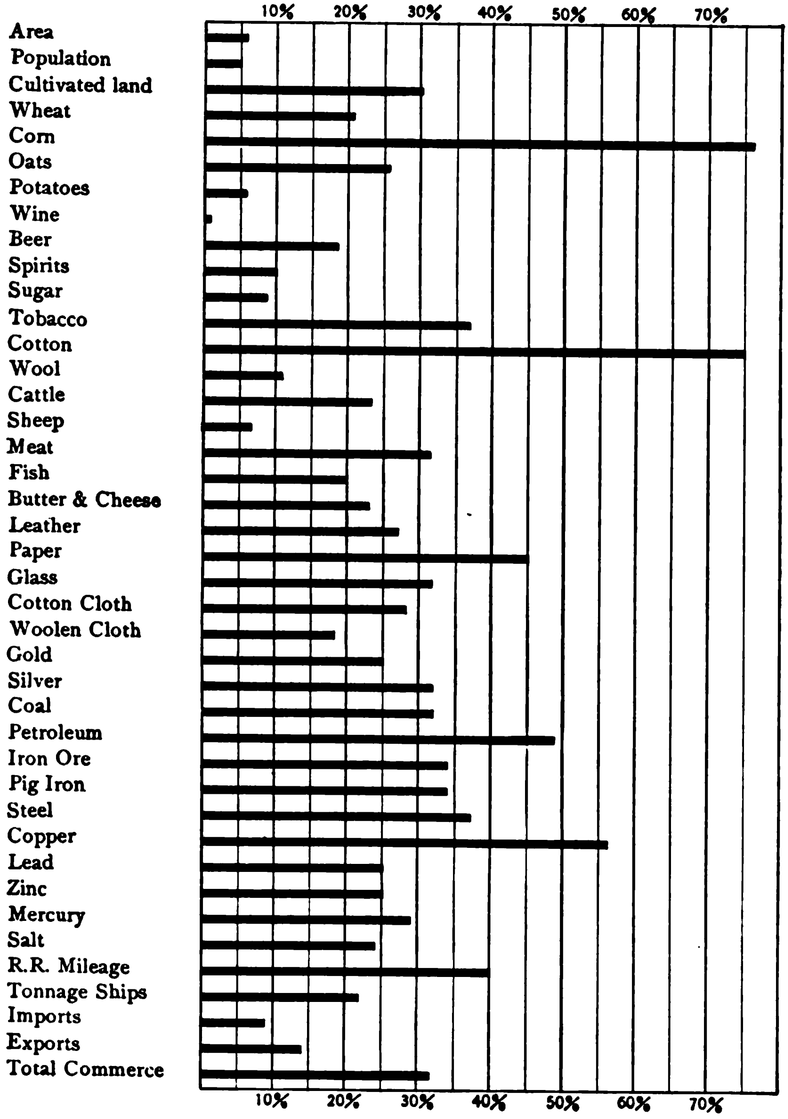
Share of the United States in the World's Industries and Products.



From Gannett, Garrison, and Houston's "Commercial Geography"

ago, has established many industrial and commercial schools of great efficiency and usefulness, and has emphasized the study of commercial geography in all her schools.* In the United States, on the other hand, we have not paid much attention to the subject until recently. Protected by a high tariff, and assisted by a general inventive faculty greater and more practical than any people have ever shown, we have gone on developing our own resources until we are now able to manufacture not only nearly everything we want for ourselves, but also an unlimited surplus which we are desirous of selling at best profit to other countries. The subject of commercial geography, the wants of other people and how they are supplied, now becomes to us very important, and as the authors of this book state in their preface:

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* See Nat. Geog. Mag. March, 1905, pp. 111–117.

"As applied to our own country, this study is especially stimulating ; for we have advanced to the front rank in the leading industries of agriculture, mining, manufacturing, and transportation. If this prosperity were due entirely to the generosity with which nature has showered her gifts upon us, no lesson could be drawn from it ; but the history of the past, and a comparative study of the different countries in the present, teach us that without man's earnest and thoughtful coöperation the greatest wealth of natural resources may co-exist with the greatest stagnation in development. If, therefore, in the face of the competition that grows keener as the years advance, we would maintain our superior position, we must not grope blindly, but must know the causes of success and failure and act with the clearest understanding."

"Commercial Geography" is designed as a text-book in the high school and academy, but it will doubtless prove no less useful and just as interesting to many of the grown-up generation, who were offered no such course in their school-days, and who have had to obtain their knowledge of commercial geography as best they could. It begins with a study of the influence on industrial progress of climate and topography, of social conditions, of manufacturing and transportation facilities, and of financial conditions, giving due weight to each as a factor in economic development. When this foundation is laid the student is ready to consider with a broader interest the chief commercial products of the world, their relative importance in different regions, and the modern processes of manufacture of the staple articles consumed. Then, beginning with the United States, he studies in greater detail the actual conditions existing in the principal countries of the world and the forces that are operating to the continuance or change of such conditions. The relations of the various industries to one another and their location in different parts of the world are shown graphically by maps and by percentage diagrams or tables, while definite quantities are given in tables at the end of the book.

For world diagrams the authors have generally used a map of the world on Mollweide's elliptic projection. On this map every part of the globe appears in equal proportion, with the result that the geographical distribution of products is shown without being distorted as we get away from the equator. An excellent index is given.

The Italian in America. By Eliot Lord, John J. D. Trenor, and Samuel J. Barrows. Illustrated. Pp. 268. 8 x 5½ inches. New York: B. F. Buck & Co.

What becomes of the hundreds of thousands of immigrants into the United States each year? What work do they take up to support themselves in their new country, and where do they go to? In 1904 we accepted 191,000 Italians, and in 1905 221,000. How are they prospering now? is a question which many are constantly asking, but to which we have had much difficulty in finding the answer. "The Italian in America" attempts successfully to give us this information, and we are glad to learn that it is one of a series of volumes to be published by Benj. F. Buck & Co. treating of the principal nationalities comprising our recent immigration. The authors of the present work think very highly of our Italians. They are frugal, ambitious, and loyal citizens and are important contributors to the material development of the United States. It is unfortunate that so many have been compelled to remain in our big cities, but there are many thousands who are spreading over the land, buying and settling down on cotton plantations in Texas and Louisiana and on the citrus and fruit farms of southern California. The average Italian, says Mr Eliot Lord, prefers the country and goes there as soon as he gets enough money to take him. Mr Lord quotes Adolfo Rossi, supervisor of the Italian emigration department, as saying that 84 per cent of the Italians coming here are between 18 and 45 years of age; 84 per cent are, in other words, producers. Every Italian costs his country $1,000 to bring up; but by leaving Italy the $1,000 invested in him by his country is lost. "We spend a thousand dollars to bring up and develop a young man, and then you reap the profits of the investment."

The Far Eastern Tropics. By Alleyne Ireland, F. R. G. S. 8vo, pp. 7+339. Boston and New York: Houghton, Mifflin & Co., 1905.

This is a critical account of the government, administration, and to some extent the industrial condition of certain eastern peoples—Hongkong, Borneo, Sarawak, Burma, Malay States, Straits Settlements, French Indo-China, Java, and the Philippines.

Mr Ireland is English by birth, and while it may not be quite fair to quote, with reference to him, the old saying, "What's English is good, what isn't, ain't," the book unquestionably suggests it. He is also everywhere cocksure of himself.

Hongkong, he says, is a marvel of growth, a city of 300 000 people, built up in sixty years. But to us that is not so strange, for San Francisco, with an equal population, is younger, while Chicago, with its 2,000,000 inhabitants, is but little older. He tells us that the foreign commerce of Hongkong exceeds that of any other city on earth, forgetting that everything that comes and goes is foreign, even the nightly boat to Canton. If we should add to the foreign commerce of New York its domestic commerce, including the fleet that every night goes up the Sound, Hongkong would not be in the same class.

It is, however, with what he says about the Philippines and our conduct of their affairs that we are most interested, and to this subject he devotes nearly half the book. In company with many Englishmen, who are watching with critical eyes our course in the Philippines, he entirely misunderstands our purpose. We are not governing the Philippine Islands, as they suppose, but are helping the Filipinos to govern themselves, and between these there is a great difference. Mr Ireland is surprised and disturbed that we have not molded the Philippine government on the pattern of English colonies, and, with sublime assurance, assumes that our failure to do so is due simply to our ignorance of British colonial methods. It has not occurred to him that the statesmen who framed the Philippine government, being entirely familiar with foreign colonial history, made use of the experience of other nations only as far as it could help them. Mr Ireland can rest assured that wherever the Philippine government departs from British colonial methods there exists a good reason therefor, even though he may be unable to explain it. He also objects to our plan of developing a good government before developing the industries, forgetting that the latter cannot and will not take precedence of the former. Did the world ever see industrial development under unstable government?

Mr Ireland has a very low estimate of the industrial efficiency of the Filipino, obtaining his measure of it by the curious method of dividing the exports of the Archipelago by the number of inhabitants. What relation the resulting figure has to anything it would be difficult to discover, but by means of it he places the Filipino at the foot of all tropical peoples, with $5 each, as compared with $12 for Porto Ricans and $44 for the people of the Federated States. Let us extend the comparison on the same basis; the Chinese would stand at the bottom with only 50 cents—*i. e.*, they are only one-tenth as efficient as the Filipinos. The people of the United States, who may fairly be regarded as efficient, rate at $18, far less than the people of the Federated States, less even than the negroes of Sierra Leone.

The fact is, as is shown in the Census Report, the Filipinos are at least as efficient as any other tropical people.

Mr Ireland criticises the expense of the Philippine government, and, as a basis for comparison with other colonial governments of the Far East, he compares the cost of government with the amount of exports. Here again there does not appear to be any relation between the two factors. The statement that the cost of government is a certain proportion of the export trade is utterly meaningless. One would suppose that he would have compared the cost of government per capita of the people governed, the ordinary method of comparison, but this would not yield the results which he wishes, since the cost of government in the English colonies in the East is much greater per capita than in the Philippines.

He ridicules the Philippine Civil Service examinations and contrasts them with those held for the East Indian service. If the examination for the East Indian service, which he instances is for the same grade of clerk as is the Philippine examination—*i.e.*, the lower grade—he merely succeeds in holding up to ridicule the Indian examinations. Why should a clerk be expected to be versed in the higher mathematics, in Sanskrit, and in the old English poets in order to audit accounts or keep books? Yet that is apparently required. The book bristles with errors and misstatements, but enough have been adduced to put the reader on his guard. H. G.

A Century of Expansion. By Willis Fletcher Johnson, L. H. D. With maps. Pp. 316. 5 x 7½ inches. New York: The Macmillan Co.

The author gives a very thoughtful analysis of our expansion as a nation. He shows that our growth has been regular, not spasmodic, and that if we would continue strong we must continue developing intellectually and physically. The saying, "When growth ceases the man begins to die," is as true of nations as of the individual man.

"Territorial expansion increases power, enlarges the sphere of activity, adds to responsibilities and duties, creates new problems for solution, leads to new relationships, and thus induces constitutional—that is, intellectual and moral—development of the nation. The physical growth of a man is steady, persistent progress, not an irregular series of disconnected spasms. We may say the same of our territorial expansion. However widely and irregularly separated by time, the individual acts of territorial acquisition are all intimately and essentially related. Order and design characterize them. The law of cause and effect is dominant among them. In the first step of expansion, in colonial times, every subsequent step was forecast and made inevitable. From Washington at Great Meadows to Dewey in Manila Bay, the span in both time and space is enormous, but it is a span of unbroken links of cause and effect—coherent, logical, and inevitable."

Mr Johnson's style is clear, concise, and rich in classic allusions and incidents. He furthermore handles his subject in a clever, suggestive way that tells just enough and stimulates the reader to do some thinking for himself.

SOME RECENT GOVERNMENT REPORTS

The Avocado. G. N. Collins, Bureau of Plant Industry, Bull. 77.

The Variability of Wheat Varieties in Resistance to Toxic Salts. L. L. Harter, Bureau of Plant Industry, Bull. 79.

Agricultural Explorations in Algeria. Thomas H. Means, Bureau of Plant Industry, Bull. 80.

Evolution of Cellular Structures. O. F, Cook and Walter T. Swingle, Bureau of Plant Industry, Bull. 81.

Grass Lands of the South Alaska Coast. C. V. Piper, Bureau of Plant Industry, Bull. 82.

The Vitality of Buried Seeds. J. W. T. Duvel, Bureau of Plant Industry, Bull. 83.

The Mexican Cotton Boll Weevil. W. D. Hunter and W. E. Hinds, Bureau of Plant Industry, Bull. 51.

Experiments in the Culture of Suger Cane and its Manufacture into Table Syrup. H. W. Wiley, Bureau of Chemistry, Bull. 93.

Tobacco Investigations in Ohio. George T. McNess and George B. Massey, Bureau of Soils, Bull. 29.

The Commercial Cotton Crop. James L. Watkins, Bureau of Statistics, Bull. 34.

Statistics of the Fisheries of the New England States. A. B. Alexander, Bureau of Fisheries, Bull. 575.

A Revision of the Cave Fishes of North America. Ulysses O. Cox, Bureau of Fisheries, Bull. 579.

The Gas Disease in Fishes. M. C. Marsh and F. P. Gorham, Bureau of Fisheries, Bull. 578.

Critical Notes on Mylocheilus Lateralis and Leuciscus Caurinus. John Otterbien Snyder, Bureau of Fisheries, Bull. 574.

Notes on the Fishes of the Streams Flowing into San Francisco Bay, Cal.

The Life History of the Blue Crab. W. P. Hay, M. S , Bureau of Fisheries, Bull. 580.

Geology of the Tonopah Mining District, Nevada. J. E. Spurr. Geological Survey, Prof. Paper 42.

NATIONAL GEOGRAPHIC SOCIETY

THE completed program of the popular and technical meetings of the National Geographic Society for 1905–1906.

THE POPULAR COURSE

The addresses in this Course will be delivered in the National Rifles Armory, 920 G street, at 8 p. m. on Friday evenings of the following dates:

November 10—"A Review of the Russo-Japanese War—from the Sinking of the *Variag* to the Signing of the Treaty of Portsmouth." By Mr Robert L. Dunn, special correspondent of Collier's Weekly in the Far East.

The address is a pictorial summary of the war, being illustrated by nearly 200 views.

November 24—"The Panama Canal." By Hon. James R. Mann, Member of Congress from Illinois.

December 8—"What Shall be Done with the Yosemite Valley." By Mr William E. Curtis. Illustrated.

The Yosemite Valley has been receded to the federal government by act of the California legislature, but has not yet been formally accepted by Congress.

December 9 (Saturday)—"A Military Observer in Manchuria." By Major Joseph Kuhn, U. S. A. Illustrated.

December 22—"An Attempt at an Interpretation of Japanse Character." By Hon. Eki Hioki, First Secretary of the Japanese Legation.

January 5—"Russia and the Russian People." Mr Melville E. Stone, General Manager of the Associated Press, has accepted the invitation of the Society to deliver the address on this subject, provided the demands of the public service do not interfere.

January 9 (Tuesday)—"The Ziegler Polar Expedition of 1903–1905." By Messrs W. S. Champ, Anthony Fiala, and W. J. Peters.

A novel feature of this meeting will be the exhibition of moving pictures of Arctic scenes.

January 19—"Railway Rates." By Hon. Martin A. Knapp, President of the Interstate Commerce Commission.

February 2—"Austria Hungary." By Edwin A. Grosvenor, LL. D., Professor of International Law in Amherst College, author of "Constantinople," "Contemporary History," etc.

February 16—"Africa from Sea to Center." By Mr Herbert L. Bridgman. Illustrated.

Africa in transition today challenges the attention of the world. Few intelligent Americans know to what extent its possibilities have been developed since Livingston's day, a development that in rapidity promises to exceed that of North America.

February 23—"The Personal Washington." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

This is not a lecture in the ordinary sense of the word, but it is an exhibition, through the medium of the stereopticon, of the greatest collection of prints, manuscripts, and letters referring to the personal side of Washington, ever brought together.

March 2—"Our Immigrants: Where They Come from, What They Are, and What They Do After They Get Here." By Hon. F. P. Sargent, U. S. Commissioner General of Immigration. Illustrated.

March 16—"Oriental Markets and Market Places." By Hon. O. P. Austin, Chief U. S. Bureau of Statistics. Illustrated.

March 30—It is hoped that official business will permit the Secretary of the Navy, Honorable Charles J. Bonaparte, to address the Society on "The American Navy."

April 13—"The Regeneration of Korea by Japan." By Mr George Kennan. Illustrated.

SCIENTIFIC MEETINGS

The meetings of this course will be held at the new home of the Society, Hubbard Memorial Hall, Sixteenth and M streets, on Friday evenings, of the following dates.

November 17—"Morocco." By Mr Ion Perdicaris.

November 25 (Saturday)—"The Panama Canal." By Mr Bunau-Varilla.

December 1—"The Development of the Mineral Resources of Alaska, with particular reference to the Fairbanks and Nome Regions." By Mr Alfred H. Brooks, Chief of the Alaskan Division, U. S. Geological Survey.

December 15—"Surveying our Coasts and Harbors." By Hon. O. H. Tittmann, Superintendant U. S. Coast and Geodetic Survey.

December 29—"Problems for Geographical Research." By Gen. A. W. Greely, U. S. A.

"The Binding Power of Road Material." By Mr A. S. Cushman.

January 12—Annual meeting. Reports and elections. "Progress in the Reclamation of the West." By Mr F. H. Newell, Chief Engineer Reclamation Service.

January 26—"The Carnegie Institution." By President R. S. Woodward.

February 9—"The Introduction of Foreign Plants." By Mr David G. Fairchild, Agricultural Explorer, U. S. Department of Agriculture.

February 24 (Saturday)—"Hunting with the Camera." By Hon George Shiras, Member of Congress from 3rd District, Pennsylvania.

March 9—"The United States Bureau of the Census." By Hon S. N. D. North, Director.

March 23—"The Death Valley." By Mr Robert H. Chapman, U. S. Geological Survey.

April 6—"The Total Eclipse of the Sun, July, 1905, as Observed in Spain." By Rear Admiral Colby M. Chester, U. S. N., Superintendent U. S. Naval Observatory.

April 20—"The Protection of the United States Against Invasion by Disease." By Dr Walter Wyman, Surgeon-General Marine Hospital Service.

WE have published a new edition of our map of Alaska, which was prepared by the United States Geological Survey. The map is 36 by 42 inches, in 3 colors, and is the first contour map of Alaska that has been made. : : : : By mail, 25 cents.

National Geographic Society

Hubbard Memorial Hall : Washington, D. C.

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The NATIONAL GEOGRAPHIC MAGAZINE

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VOL. XVI, NO. 12 WASHINGTON DECEMBER, 1905

THE NATIONAL GEOGRAPHIC MAGAZINE

THE PARSEES AND THE TOWERS OF SILENCE AT BOMBAY, INDIA

BY WILLIAM THOMAS FEE, U. S. CONSUL GENERAL, BOMBAY

The following story of the Parsee people and the description of the Towers of Silence at Bombay were written at the United States Consulate largely during hours in the night-time, at seasons when the excessive heat of India prevented Dame Nature from performing her part of the "sweet restorer."

It is not claimed that anything new has been told, though it is hoped that some of the old may have been stated in a new light. It is mainly descriptive and written solely for the pleasure and profit of my fellow-countrymen, who of late years have found much of interest in the traditions and customs of the people of India.

I am under great obligations to many Parsees for considerable data and help given me, but especially to my friend, the late Dossabhai Framjee Karaka, the historian.

The drawing and photographic feature is made use of to illustrate the development and individual attainments of members of this remarkable race.

WM. THOS. FEE.

THOUGH comparatively small in point of numbers, the Parsees occupy one of the foremost places among Indian nationalities. Their social position, peculiar customs, manners, and foreign designation are impressively striking to a stranger on his first visit to Bombay. Their story is a romantic tale of a people whose ancestry appeared at the very dawn of history, and who occupied Persia when Abraham was a nomadic wanderer, tending his flocks on the sandy plains beyond the Euphrates. They claim that their ancestral race was the foremost Asiatic nation of their time, whose grandeur, magnificence, and glory were unsurpassed; that their kings were the most powerful and wisest of monarchs, whose armies were renowned for courage and military prowess; that they were valorous and energetic, bringing up their youth to "ride, draw the bow, and speak the truth;" that their heroes were as humane as they were courageous; that their women were as brave as they were fair, and as celebrated for the freedom allowed them as for their modesty.

"RELIGION OF ZOROASTER"

The Parsees are of Persian origin, of the Iranic race, and are supposed to have had a common ancestry, somewhere in West-Central Asia, where man, as we now know him, is said to have had his birth. More than 3,000 years ago their forefathers left the uplands of that mysterious Aryan home from which our own ancestors had already gone forth, and were in all probability the first of the Indo-European family to embrace a purely monotheistic faith.

In religion they are followers of Zoroaster, who was a religious reformer and founder of this ancient Persian religion at a period probably prior to the Assyrian conquest of Bactria, his native country, which is said to have taken place 1,200 years before the Christian era. At all events, the religion of Zoroaster can certainly claim a hoary antiquity which unquestionably challenges our deep respect.

The scripture of this faith, the Parsee Bible, is called the "Zend-Avesta" or, more properly, simply "Avesta," or "Avesta and its Zend." While Zend is understood to mean the translation of the original text and commentary, in the Zend language, the oldest form of Iranic speech known, and to which Dr March gives the name of "Old Bactrian," the Zend-Avesta embraces the whole Parsee religious literature, ancient and modern.

The Avesta proper is one of the most interesting documents coming to us from the early history and religion of the Indo-European family. It is made up of several distinct parts, many of which are fragmentary and of different ages, some of which must be many centuries older than our era. This religious system is a monotheism. It recognizes the dual principle of good or light, and evil or darkness. Fire is its principal emblem, as being the purest of all elements; hence the misconception that its adherents are fire-worshipers. The common charge of worshiping fire, the sun, water, and air, brought against the Parsees, is not well founded. The Parsees emphatically deny the charge, and history gives several accounts of acts of hatred shown by the Parsees toward idolatry.

God, according to the Parsee faith, is the creator, preserver, and ruler of the universe. He is the emblem of glory and light. In view of this a Parsee while engaged in prayer is directed to stand before fire or turn his face toward the sun, because they appear to be the most proper symbols of the Almighty. Such is still the present practice among their descendants in India.

Zoroaster, the Parsee Moses, appears as a being of supernatural endowments and as receiving from the supreme divinity, by personal interviews, by questions and answers, the truths which he is to communicate to men. The idea of a future life and the immortality of the soul pervades the whole of Avesta literature. The doctrine of the resurrection of the body at the time of the last judgment is claimed as a genuine Zoroastrian dogma, without the slightest trace of its being borrowed from a foreign source.

With religion Zoroaster has combined both moral and speculative philosophy in a remarkable degree. In regard to man, he takes cognizance of two intellects—the "Asno-Krato," the innate or born wisdom, and the "Goashosruto-Kratu," or acquired wisdom. The Zend-Avesta insists in emphatic terms that "virtue alone is happiness in this world," and its path is the path of peace.

The moral foundation of the Parsee religious works is built upon three basic injunctions, which are pithily expressed in the Avesta, viz., "Humata," "Hukhta," and "Hvarshta," which mean "good thoughts," "good words," and "good deeds."

EMIGRATION TO INDIA

When the Persian Empire of Sassanides was destroyed by the Saracens in 651 A. D., the great mass of the nation was forced to adopt the faith of Islamism, the religion of their Mohammedan conquerors; but a small number clung to the old Zoroastrian faith and took refuge in the wilderness of the Persian province of Khorasan. After much wandering and enduring great persecution and hardship, they, in the eighth century, emigrated to India and made a settlement at Sanjan, in the neighborhood of Surat. Here they lived in the Sanjan country for some seven hundred years in tranquillity and in full enjoyment of their religious rites, under the government of the Hindoo rajahs of Sanjan, Guzerat.

They chiefly occupied themselves in agriculture and industrial pursuits. It is said that they not only turned the face of the territory they occupied from a dreary jungle into a fruitful garden and made it blossom as the rose, but they also enjoyed considerable prosperity.

About the time of the discovery of America the Hindoo rajah's government, under which they lived, was overthrown by a Mohammedan-Afghan conqueror. The Parsees, with a high character for fidelity, were loyal to the Indian kings, who had given them and their ancestors a welcome when they had been driven from their own Persian homes by the same foe. They gathered their forces to the standard of the rajahs, and proved themselves of great valor. The result of the campaign was, however, one of disaster. They were finally dispersed from the Sanjan country and compelled to seek new homes in other parts of Guzerat.

It was probably some time after this event, though there does not seem to exist any authoritative record of the exact date when the Parsees arrived in Bombay. It may, however, be safely said that their settlement in that island was some time before Bombay was ceded to the British, in 1669, by the King of Portugal, as a dowry of Catherine, Princess of Braganza, who became the wife of Charles the Second of England.

As a sect in Persia they have disappeared under religious persecutions, and have sunk into ignorance and poverty, though still preserving a reputation for honesty, industry, and obedience to law superior to that of other Persians.

THEY HAVE RETAINED THEIR INDIVIDUALITY FOR 1,200 YEARS

There seems to be no authoritative information as to the number composing the first exodus to India, or if the Parsee colony was ever materially increased by early additions from Persia. Some traditions have it that there was a paucity of females among them, and that they intermarried with Hindoo women on their first coming to India. This traditional intimation of racial mixture is not well received by the Parsee people of today. However it may have been, there is one thing certain, that if ever the practice did occur it surely was short-lived, as no custom of today is more religiously observed than that of intermarriage among their own people.

For some 1,200 years they have lived among the all-absorbent Hindoos, yet this mere handful of people have not been absorbed. During the last 300 years the transmissive influence of an Anglo-Saxon civilization has been reflected upon them, yet they remain Parsees still. India has in turn been conquered and reconquered by all the great nations of history, from Greek to Britain. Her conquerors have each shaped the affairs of half of the earth. The possession of the Indian Peninsula seems an indispensable requirement for sovereignty in the East. Internecine wars, racial strifes, and caste prejudices have robbed her of her own; pestilence and famine have blighted her fairest flower; yet during all these centuries, amid all the vicissitudes of oriental life, have lived the worthy descendants of the ancient Persian people, true to their faith, and have substantially preserved and transmitted the main characteristics of their ancestral race. The Parsee stands unique in the history of mankind.

The Parsees of India have been exceedingly prosperous and have steadily increased in number, now being variously estimated at about 100,000 souls. They are most numerous in Bombay. A few have settled in China and remote places in India for the purpose of trade, but these outlying settlements do not contain more than perhaps 4,000 people. It is calculated that about 85 per cent of the Parsees in India reside in the Bombay presidency, which was found by the census taken by the government of India in 1901 to be 78,552. Of these 46,231 reside in city of Bombay.

On the spread of Mohammedanism to India they became again the subject of persecution. Since the occupation of India by the British they have fared better, and now form a peaceful, intelligent, wealthy, and influential community.

PERSONAL CHARACTERISTICS

Physically they are tall and erect, having remarkably small hands and feet, with facial features resembling the Europeans. They have a quickness of action bordering on nervousness. Their hair is jet black and their eyes are dark. In their manners they are exceedingly polite, kind, and hospitable, often putting themselves to great inconvenience to accommodate a stranger. In the habit of diet they are religiously abstemious, and are exceedingly temperate in the use of tobacco and intoxicating liquors.

Excepting, perhaps, fish, fowl, and mutton, they are not a "meat-eating people." Like most oriental nations, a principal food among them is rice, served in curries and in a hundred different ways.

Fully three-fifths of the population of the globe live on rice; the founders of the five great religions of the world were nourished by it. It might be worth while for scientists to look a little more closely into the brain-making qualities of this worthy food.

They were never known to have practiced the barbarous custom of "suttee," the burning of the widow on the funeral pyre with the corpse of her husband, or of following their Hindoo neighbors in the cruel practice of prohibiting their widows, often mere infants, from remarrying. They are also free from the caste system so rigidly practiced by the Hindoos. Since they have freed themselves from Hindoo influences and become amenable to Western civilization, the practice of infant marriage has substantially ceased among them. Their women are treated with respectful consideration and have long since been liberated from the seclusion of the zenana and the use of the purdah.

The long, flowing "saree" of many silken tints, wrapped about the body in graceful folds, gives to the female Parsee a garment of exquisite beauty and rare comfort. It would be a matter of great regret if this graceful dress should give place to modern European fashion, with the tight corset and the high-heeled shoe, that destroy the graceful carriage and health of the wearer.

The Parsee women are generally of good figure and of pleasing and intelligent countenance. Many of them have a light olive complexion and are considered very handsome. They appear to great disadvantage by being obliged to conceal their hair, of which nature has graced them in a most luxuriant manner, under the "mathabana," a custom regarded as a token of feminine modesty. A Parsee historian states that there is no injunction against keeping the head uncovered; yet the Parsees have imbibed the notion, supported by long usage and originally imported from Persia, that it is sinful and contrary to religion to leave the head uncovered, either by day or night; hence a Parsee is never without his skull cap or a woman without her "mathabana." The latter is a thin white linen of the size of a small handkerchief.

CUSTOMS AND MANNERS

As a separate community the Parsees have not only their peculiar religion, but also their own moral code, and as a civil body they are not only permitted, but also aided by the state, in inforcing their own laws of marriage and divorce. Their ancient custom governing inheritance and succession has been enacted for them, on their petition, into the form of a legal statute by the empire. They enjoy full religious freedom, and their peculiar customs and manners are fully protected by the liberality of the British rule in India.

For a number of years after they came to India they adhered to the use of their native Persian language; but as time rolled on they gave it up for Gujerati, the language of the Hindoos, among whom they dwelt. Gujerati now forms their vernacular. They are taught English from earliest childhood, and they study in the schools Persian and Sanskrit as classics. They all speak Hindustani, and many of them are fluent in the Persian tongue, in which they keep up communication with their brethren in Persia.

Their worship in the course of time became tainted by many Hindoo practices, and the reverence for the fire and sun, as emblems of the glory of "Ormuzd," naturally degenerated into idolatrous practices. However, the worship in recent years has been restored to its pristine purity, and the sacred fire which Zoroaster is said to have brought down from heaven is kept burning in consecrated spots and temples are built over subterranean fires.

They have a priesthood which, strange to say, are not educators or teachers of the people, as is usually the case in other religious systems, nor are they themselves necessarily educated, but are simply a class of men who perform the ceremonial rites of the religion at marriages and funerals, tend the fires on the temple altars, burn incense, chant hyms, and say prayers.

The Parsee is imbued with a spirit of toleration and is most respectful toward the religions of others. Besides their own sacred days, they observe many of those of the Hindoos. In Bombay they celebrate the holidays of the English and close their shops and places of business on the Christian Sabbath.

There is now a marked desire on the part of the Parsees to adapt themselves to the manners and customs of the Europeans. The Parsee mode of life may be described as an eclectic ensemble, half European and half Hindoo. As they advance every year in civilization and enlightenment, they copy more closely European manners and modes of living, adopting the bad with the good—regretfully too much of the former. A Greek historian has remarked that of all nations the ancient Persians were most distinguished by their readiness in imitating foreign manners and customs. This peculiarity their descendants have retained to the present day.

During their sojourn in Guzerat they willingly adopted the language, dress, and other social customs of that country, and they now have taken as completely to English manners and customs, so much so that when they speak of "going home" they mean to England. The educated and influential classes have already adopted in their domestic life the comforts, conveniences, elegancies, and, we may also add, the costliness of the European style.

The domestic arrangements of their houses have also undergone, of late, vast changes. Their houses are generally built in good taste, upon well-conceived plans, and they are well ventilated. Their villas or garden houses are some of the best in Bombay. The drawing-rooms are richly furnished and decorated and the walls adorned with landscapes and historical pictures, while the particular boast of a Parsee is to have his house brilliantly lighted with many lamps and chandeliers of every description.

A great improvement has taken place among the Parsees in their mode of taking meals. Years ago they used, like the Hindoos, to eat them squatting on the ground, and the viands were served to them in a brass dish, on which they were all spread out at the same time, a practice still in vogue among the poorer classes. The better classes have for a long time past adopted the table and chair, with all the usual accompaniments of a European dinner. At large parties the table is spread out in English fashion, instead of as formerly, when hundreds sat in a line in rows upon an oblong sheet of cotton cloth laid upon the floor, each eating his food off a plantain leaf upon which it was laid out.

The public and private schools of Bombay are largely attended by their children, and every effort is made to procure translations of standard English books. As a matter of fact it may be said that the Parsees are very progressive, and that it is only necessary for them to understand the value and advantage of whatever may be offered them to induce them to accept it with eagerness.

PUBLIC-SPIRITED GENEROSITY

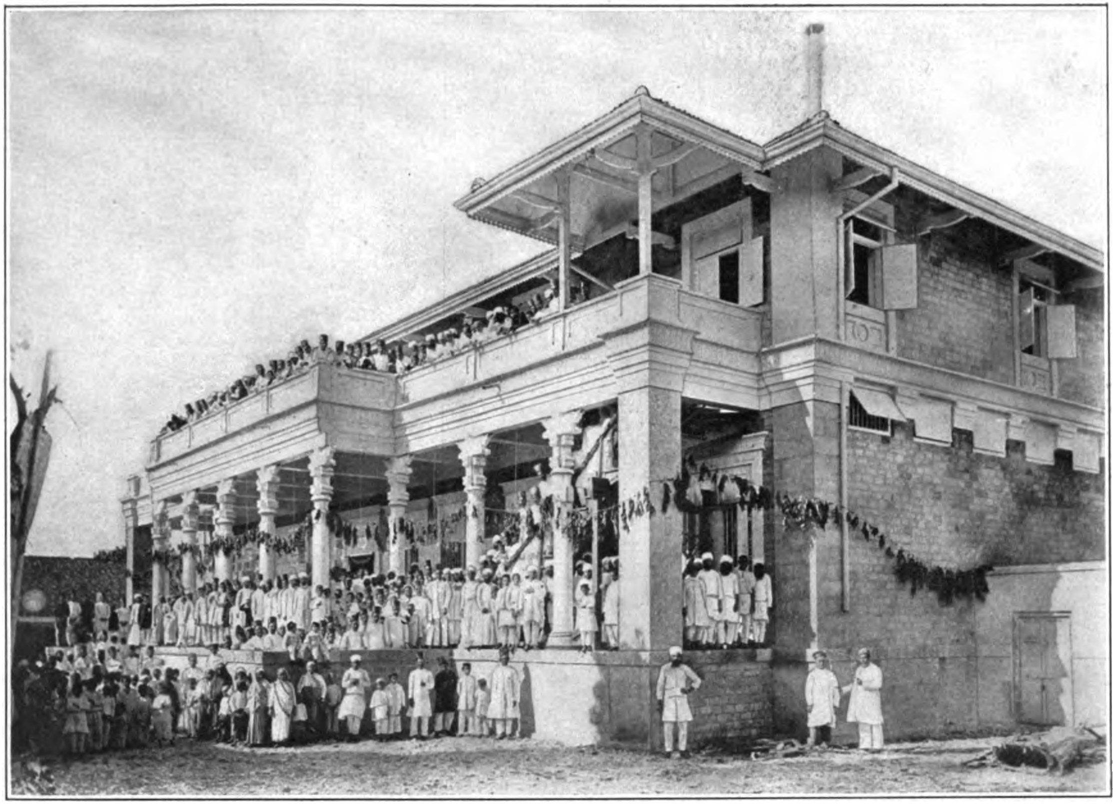
At present they seem to have lost all their military spirit. Many follow commercial and mercantile pursuits, some of them being the wealthiest merchants in India, while others have obtained high favor in government offices or have won distinction by reason of their charitable gifts. Four Parsees have been especially honored by the late Queen Victoria. The heads of two families have been made baronets—Jamsetjee Jeejeebhai and Dinshaw Maneckjee Petit—and knighthood has been conferred upon the late Kavasjee Jehangir Readymoney and M. M. Bhownagree, at present representing the district of Bethnal Green in the British House of Commons.

They provide for their own poor and infirm. Strikingly strange, one never sees in Bombay a Parsee soldier, servant, or beggar.

But their faultless generosity is broader than their race, and many of the fine public buildings, colleges, and hospitals, of which Bombay is justly proud, owe their origin and maintenance to the liberality, wealth, public spirit, and genius of the Parsees. Indeed, it is a most significant fact that the one hundred thousand followers of Zoroaster who still tend the sacred flame, in spite of their numerical insignificance, play so large a part in the development of India.

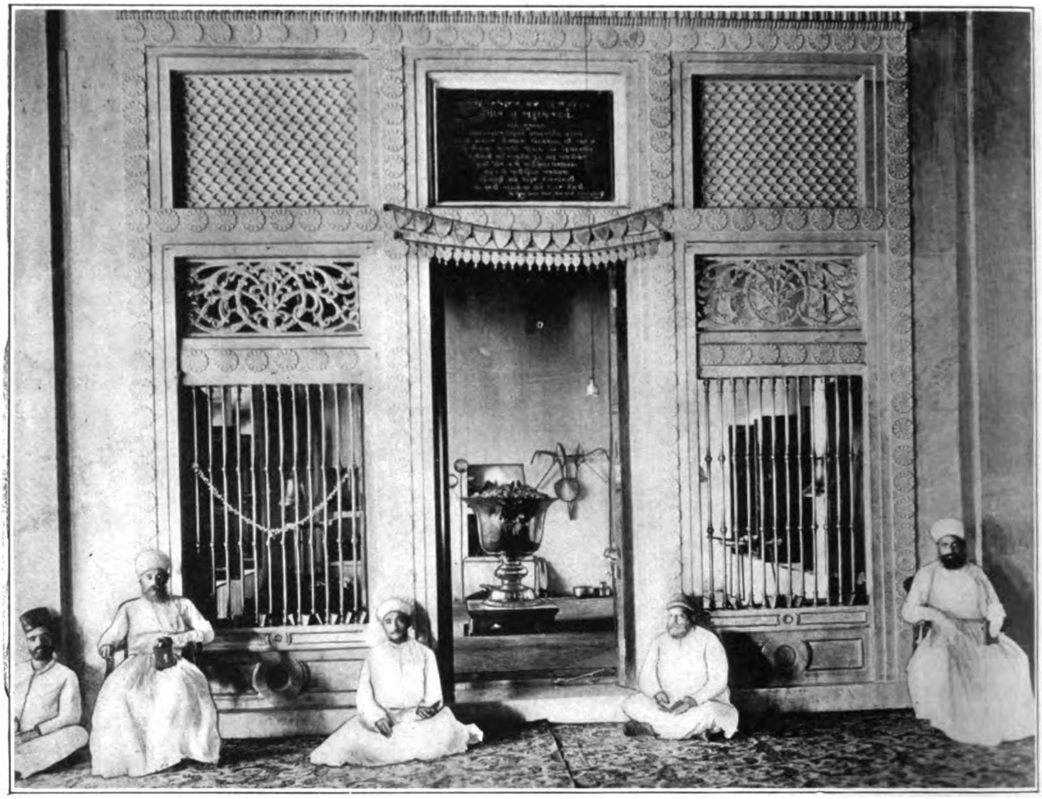
A comparison of the political standing and social surroundings of the Parsee community in Bombay with that of their sister community in Persia furnishes one of the most remarkable examples in the whole range of English history of the beneficence of British rule.

It is interesting to relate that the Parsees of Persia have been helped by their wealthy kinsmen in Bombay, especially as regards their education and the lightening of their political burdens. The rupees which the Parsee community has spent till now for the alleviation of the sufferings of their followmen, irrespective of caste or creed, are to be counted in crores, and one of the happiest and most remarkable features of it is that this spirit of catholic charity burns not only at home—that is, in the country which they have adopted as their own—but wherever they take themselves, either for the pursuit of business or pleasure.



Fire Temple at Udvada

In fulfilment of a vow made by the Parsees on their voyage to India, when they were overtaken by a severe storm, they founded a great fire temple in about the year 790 A. D., at Sanjan. This was the first fire temple founded by the Parsees in India, and is known by the name of "Iran Shah." Today there is kept burning at "Udvada" the same sacred fire that, according to the Kisseh-i-Sanjan, was lighted on the Gujerati coast 700 years before Columbus discovered America.



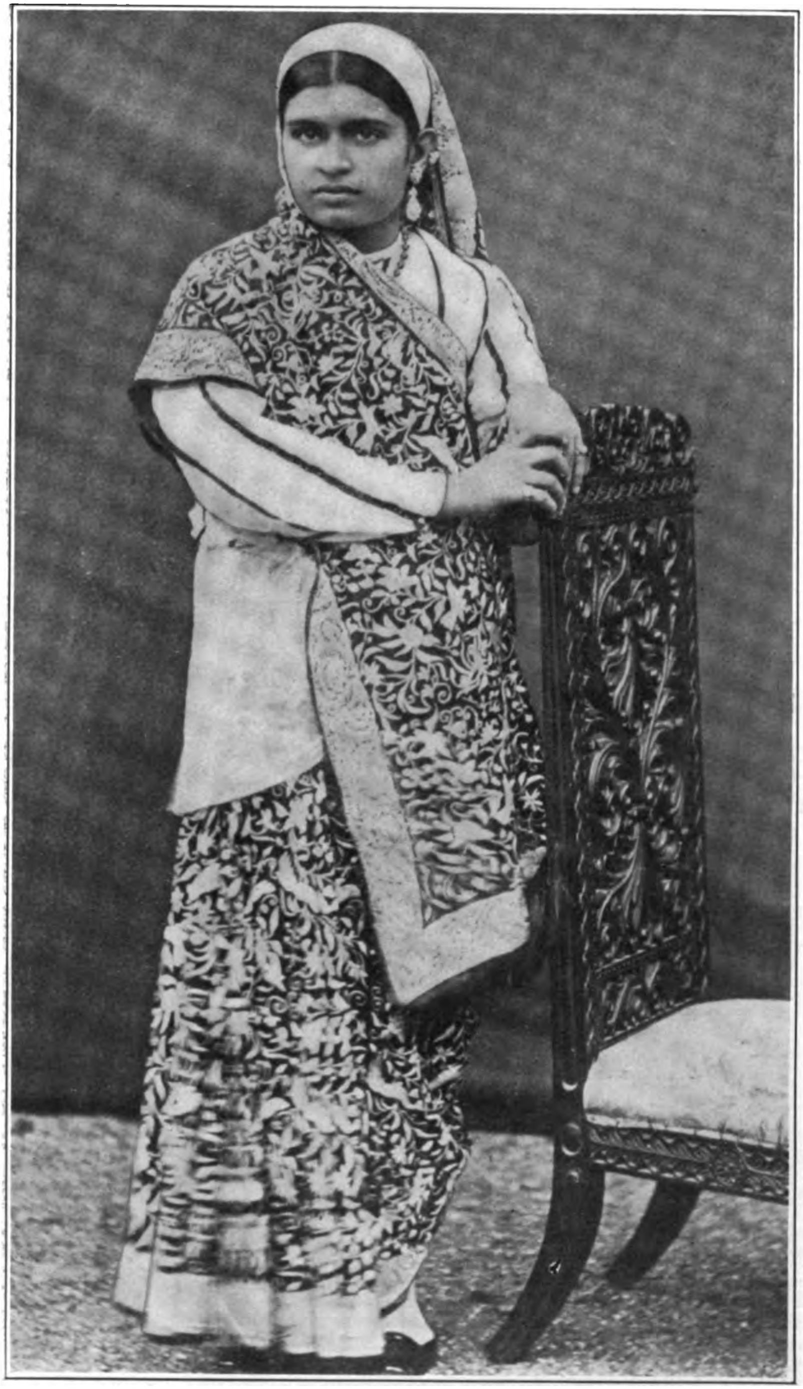
Interior of Fire Temple

There are some thirty fire temples in Bombay. The picture shows the sacred fire and attending priests in the Aujuman, or Community, fire temple at Dhobie Talao, Girguam Road, Bombay.

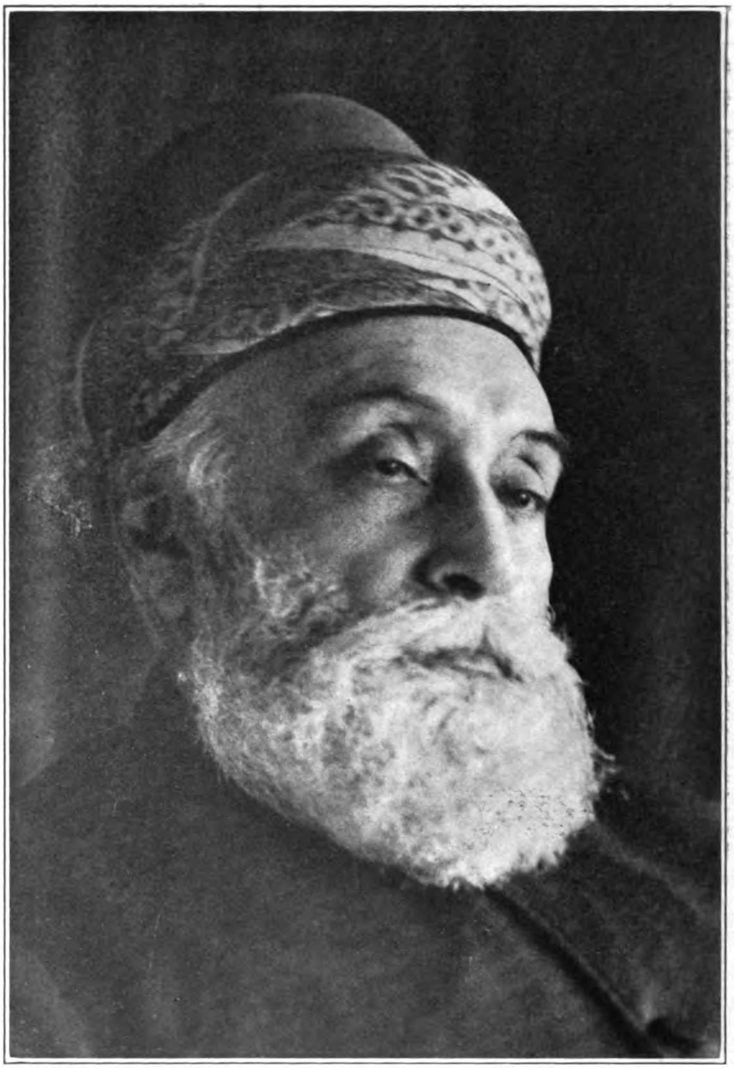
HIGHLY EDUCATED AND PROGRESSIVE PEOPLE

It will be of interest to note the per cent of literacy of this people in comparison with the principal races of the Bombay presidency, as obtained by the last government census. The population of the presidency of Bombay, including the native states, is given at 25,435,000 of people. The literacy of the inhabitants of the entire presidency is given at 6.4 per cent. The literacy of the Hindoos is given as 60; the Mohammedans as 41; the Jains as 270; the Brahmins at 320; the Parsees at 650 per 1,000 of their respective people. In point of intelligence, education, wealth, refinement, and public charity, the Parsee stands preëminently at the head of all the races of Western India.

There are perhaps few, if any, large cities where the death rate approaches that of Bombay, yet it speaks well for the sanitation and vitality of the Parsee community, on observing the comparative death rate of the different races in Bombay, that the Parsees are next lowest to the Europeans. It might be further stated that the European in India



A Parsee Lady in Regulation Dress



Jamsetjee Nusserwanjee Tata, the Business Prince and Philanthropist of Bombay

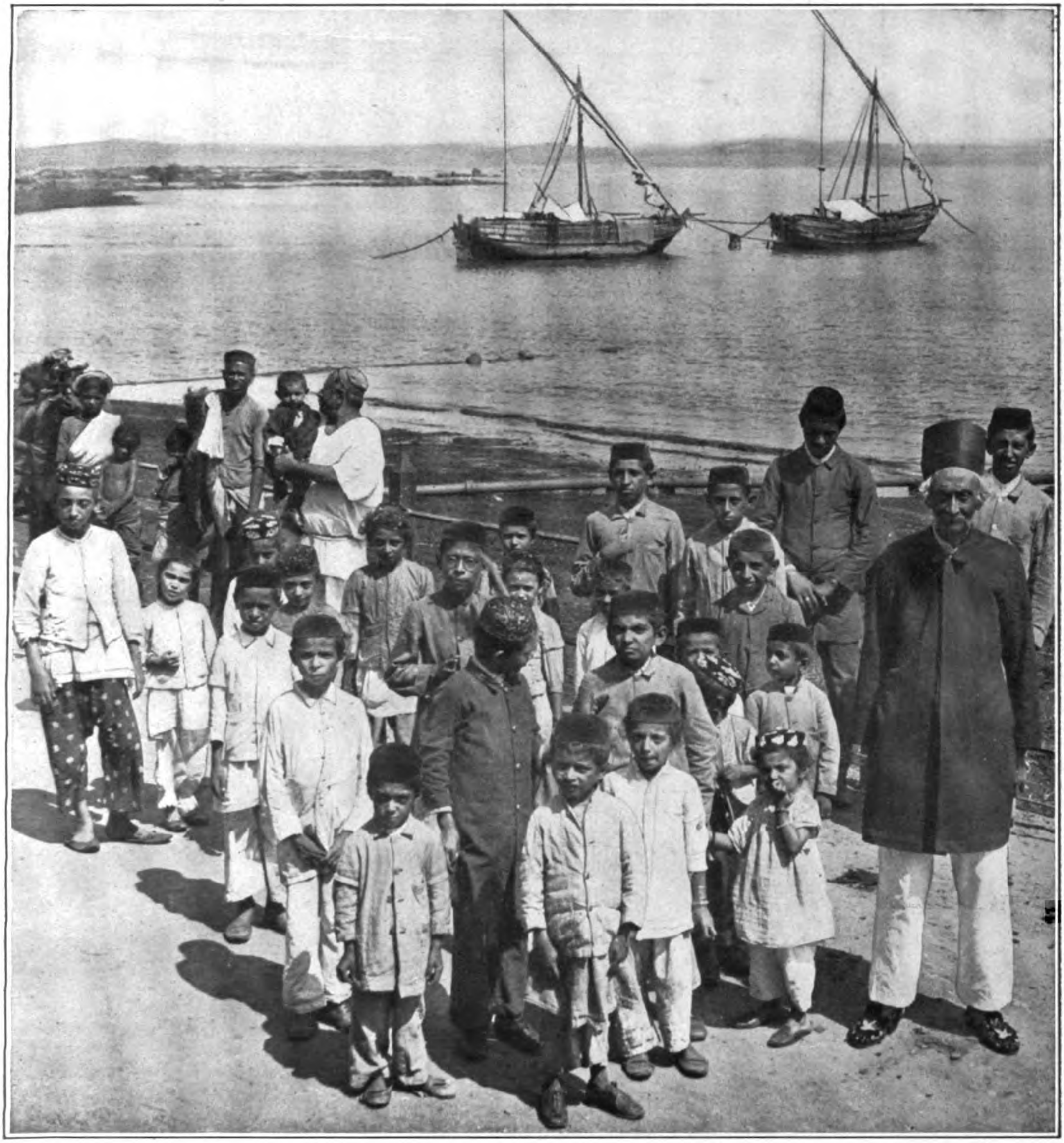
By commerce, trade with China, and cotton manufacture Mr Tata has accumulated vast wealth. His firm has branch houses and representatives in the principal cities of the world, and he has become one of the foremost business men of his race, and of India. His city residence in Bombay is palatial and his hospitality unbounded. He is the most loyal subject of the King Emperor, yet one of his present great aims is to develop some of the vast resources of India.

He has recently visited America to learn something of her manufacturing skill and methods, that he might be enabled thereby to reduce the iron ores of which India is so rich.

He has set aside thirty-two lakhs of rupees (one million dollars, gold) of his wealth for the founding of an "Indian University of Research," for the purpose of affording facilities for original scientific research and investigation in the broadest sense possible.

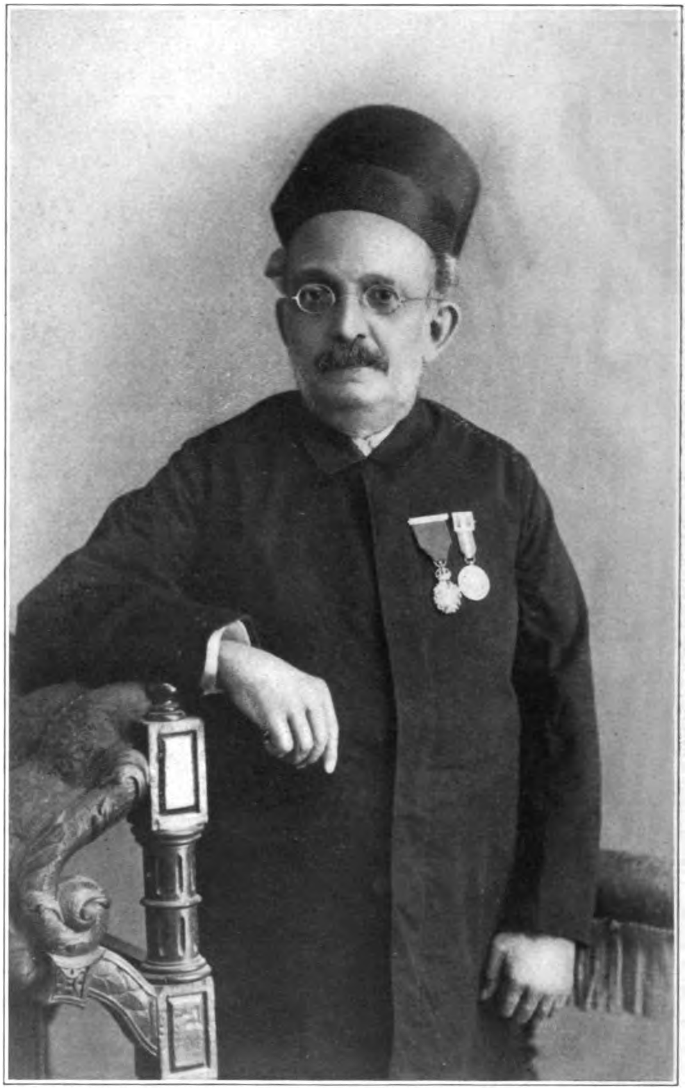
Mr. Tata is a leader in the building improvement of Bombay. The vast hotel which he is constructing is a monument to his public-spiritedness and will reflect great credit upon the city. It is built of basalt rock, is seven stories high, covers two squares of ground, and fronts on the Bay of Bombay, over which it has a magnificent outlook. It has been building for the past five years, and is now nearing completion, at an estimated cost of more than twenty-one lakhs of rupees (about seven hundred thousand dollars, gold).

He intends to make it "not only the finest hotel in India, but in all the East."



From Stereograph, copyright, by Underwood & Underwood

A Parsee Schoolmaster and His Class of Boys

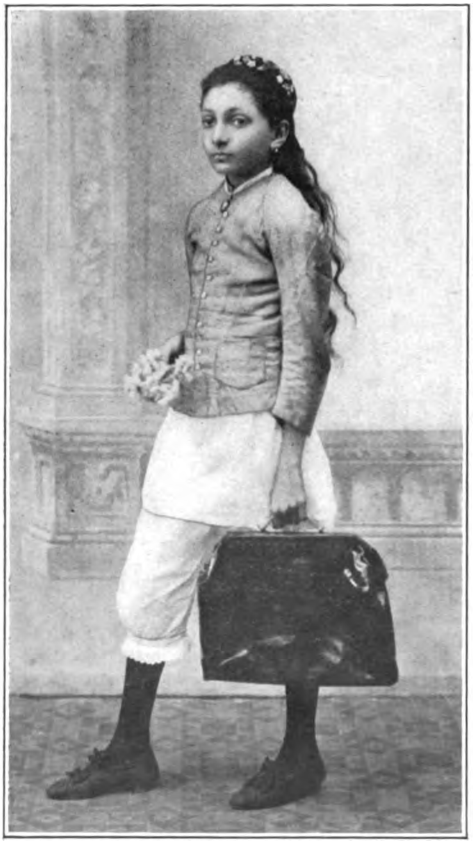


Navrozjee Maneckjee Wadia, C. I. E.

A Parsee merchant and a companion of the Most Eminent Order of the Indian Empire. He is reputed to be the richest man in Bombay. His mother, the late Bai Motlibhia Maneckjee Wadia, has endeared her memory for many generations to come by her munificent charitable gifts. Mr Wadia will leave by deed of trust his entire vast fortune to universal charity and relief of the distressed, without distinction of nationality, race, cast, color, sex, or condition. He is also the Bearer of the Cross of the Legion of Honor, conferred upon him by Napoleon III.

A Parsee Bride and Groom

A promising barrister-at-law of Bombay, with his handsome bride invariably sends his children home. The fact is there are but very few European children in Bombay, and the European population consists mainly of the adult class; hence the death rate among them would naturally be the minimum. The Parsee has many children; therefore it can be well stated that the mortality rate is decidedly in favor of the Parsee.



A Parsee School Girl in Regulation Dress

The reason that brought a custom into life in the East may have long since ceased to exist and is perhaps forgotten, yet the custom may be continued. On seeking to learn why, one is met with the answer, "It is an immemorial custom" or "It is part of religion," when in fact religion has little to do with it. But religion has a broad back.

After some devastating famine in times gone by cattle became scarce, and to encourage their increase became a necessity. The cow with the high hump was selected by the Brahmin caste or some powerful rajah and pronounced sacred; hence she was permitted to propagate and roam at will; yet today it would seem difficult to give a reason why one kind of a cow more than another, or even why any, should be considered sacred.

SOME PECULIAR CUSTOMS

In the early days the use of soaps and disinfectants were unknown. The urine of cows was found to contain an element of ammonia. The Parsees were taught to use it for cleansing and purifying purposes and as a disinfectant. Surely the reason for the practice of this disgusting and filthy habit has long ceased; yet, strange to say, it is still continued in use today, and it is even said to have a religious sanction. A corpse, though it may have died of plague or other contagious disease, is first washed and disinfected (?) with the product of the cow before being borne on an open bier through the public streets of Bombay to the Towers of Silence.

In connection with the ceremony of the dead, the face of a deceased Parsee is exposed three or four times to the gaze of a dog during the funeral oration and the dog is finally led, following the corpse, to the Towers of Silence. One is told that the dog is supposed to guide the soul of the dead toward heaven and to ward off the bad influences of evil spirits to which it may be exposed. The exact object and meaning of this strange ceremony cannot be satisfactorily given. The better-educated Parsees claim that there is no reason for it, and none seems to be found. It is a striking example of a custom being continued after the reason has ceased to exist or at least has been forgotten.

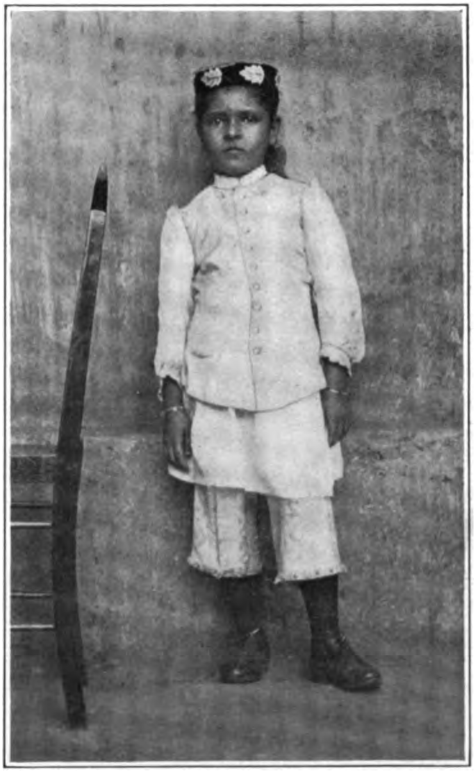
Another odd custom in vogue among the Parsees is that the name of the father is given to the son as a surname. For instance, if a Parsee of the name of "Framjee Dossabhoy" had a son whose name was Maneckjee, his full name would be "Maneckjee Framjee." When again his son had a son whose name was Jehanjir, his full name would be "Jehanjir Maneckjee." The grandfather's name is dropped entirely within three generations.

Sometimes the name of a distinguished ancestor is added after the father's name, but this is not even continued for more than a few generations. This practice has a tendency to destroy the family unit and lessen its influence and magnify the caste or tribe.

While the general voice of the Parsee community seems to be unfavorable to the admission of aliens to the Zoroastrian faith, and the trustees of the principal Fire Temple in Bombay have prohibited such persons from entering its sacred precincts, nevertheless proselytism to the religion does occasionally occur. Parsee priests are to be found whose objections can be overcome and who will permit the sacred precincts of the Fire Temple, over which they preside, to be invaded by alien converts to the Parsee faith.

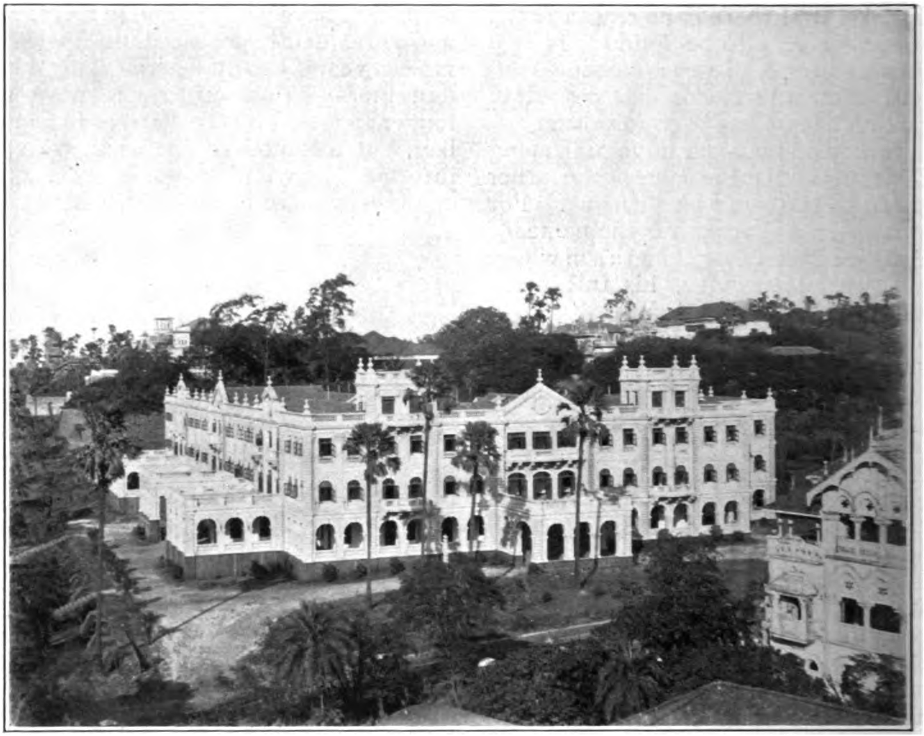
MARRIAGE CEREMONIES

The Parsees, owing to their coming in contact with the Hindoos, adopted a number of their customs, among which was unfortunately included the practice of infant marriage. Hindoos are most strictly enjoined by their "Shastras" to have their girls married before they have reached the age of nine years. Great disgrace is attached to the parents on their failure to do so. The Parsees seemed to have participated in this idea, and consequently practiced, until within recent years, infant marriage of their daughters. This custom is now no longer followed by the Parsees in Bombay, but instances of the kind, we are informed, may still occur in some out-of-the-way place in Guzerat, where the light of a higher civilization has not yet dawned. The most sensible persons among them have always disapproved of the absurd custom, and it may be stated that the practice of infant marriage among the Parsees is now a custom of the past.



A Parsee School Girl in Regulation Dress

Marriages are generally arranged by the parents of the contracting parties.



The Framjee Dinshaw Petit Parsee Sanitorium

A handsome structure for a noble purpose, built out of a fund set apart by the late Mr Framjee Dinshaw Petit for the benefit of his Parsee community.

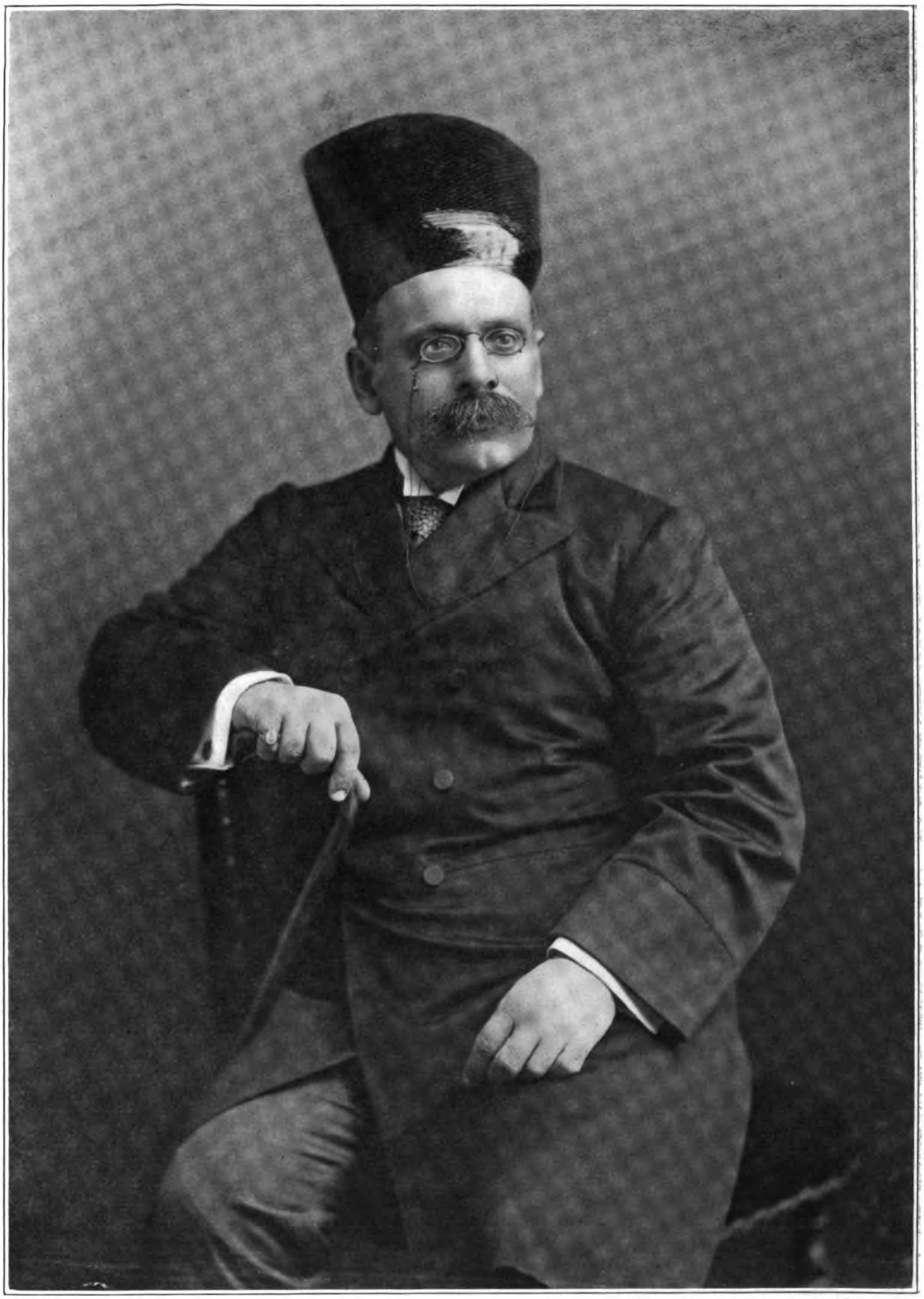
The length of the building is 293 feet and the depth is 75 feet. It can accommodate thirty-six families in all—twelve on each floor. To each of such families two rooms are assigned, with a bath-room, kitchen, and other necessary arrangements.

A noticeable feature in connection with the sanitary arrangements of the building is the introduction of the "Macerating Bacteriological Tanks" for the disposal of sewage and sullage.

The cost of the building, including grounds, is nearly five lakhs of rupees.

Sometimes they may commission a match-making priest to find a suitable party for their child. The horoscope of the boy, as well as that of the girl, may be examined by the professor of astrology to determine whether the respective stars of the proposed pair are in harmony. The wealth, position, and social standing of the parents are thoroughly investigated and considered. When the heads of both families have been satisfied and approval given as to the suitability of the match, the betrothal takes place, usually at a day fixed by the astrologer. There is little ceremony attending this occasion, and it is considered to be made binding by the exchange of presents.

For several days preceding the date of marriage, which is usually fixed on certain days of the year supposed to be propitious for such ceremony, a succession of dinners and "natches" are given to friends of the family. It is customary



Sir Jamsetjee Jijibhai, Third Baronet

He represented the city of Bombay at the Coronation of King Edward VII, and is by common consent the recognized head of the Parsee community of Bombay.

The vast wealth of his family has built bridges and reservoirs, founded and maintained universities, colleges, hospitals, schools, and charitable funds for the benefit of all races, without regard to cast, color, or creed.

on these occasions to make exchange of presents between the kinsmen of the bride and groom. The bride is also presented with valuable ornaments by the proposed father-in-law. Many thousands of rupees are spent upon these antenuptial festivities.

On the wedding day a large number of friends are invited by the contracting parties to witness the nuptial ceremony. Following the custom of the Hindoos, the wedding always takes place after the sun has set, in accordance with the promise given to the Rajah of Sanjan by the Parsees on their first landing in India. The wedding guests, when assembled, to the number frequently of one thousand and more—the men in full Parsee costume of snow white, the ladies arrayed in rich jewelry and dresses of variegated colors, splendidly ornamented with gold and embroidery, the evening enlivened by the music of a band—form a beautiful scene, rarely witnessed in any other part of the globe.

Bouquets of flowers, upon which rosewater is sprayed from a golden jar, in order to give them a perfume, are passed among the guests. Packets of "pan-supari," made of the nut of the arica palm, upon which a portion of chunam or lime is smeared, wrapped in the leaf of the beetle vine and pinned together with a clove, are distributed to the guests.

The procession of the bridegroom was formerly attended with great splendor and state, as is still the practice of the Hindoos. Gaily comparisoned horses, chariots, and sometimes elephants are used to convey the bridegroom to the home of the bride. On reaching the home of the bride, the bride and groom are seated opposite each other in chairs, placed on a carpet or large rug, and the guests and relatives are seated in circles about them.

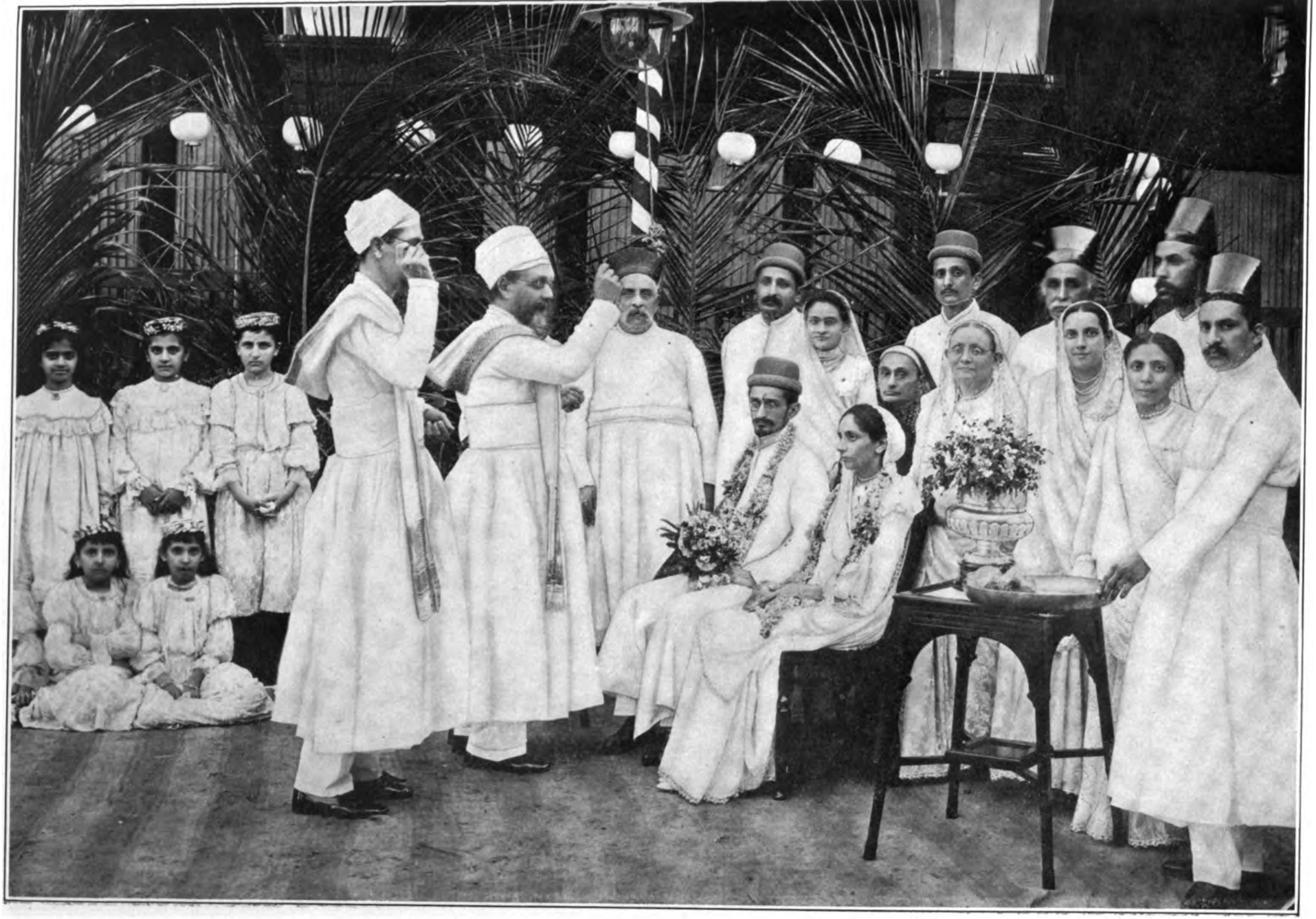
For the following details the writer has abbreviated from a description of a marriage ceremony furnished him by his good friend, the late Dossabhai Framjee Karaka:

A piece of cloth is held between the bride and groom, as a curtain, so as to screen them from each other's sight. Under this curtain they are made to hold each other's right hand in their grasp. Then another piece of cloth is placed around so as to encircle them, and the ends of the cloth are tied together in a double knot. In the same way raw twist is taken and wound round the pair seven times by the officiating priests, who during the performance repeat the short prayers of Yatha Ahu Vairyo.

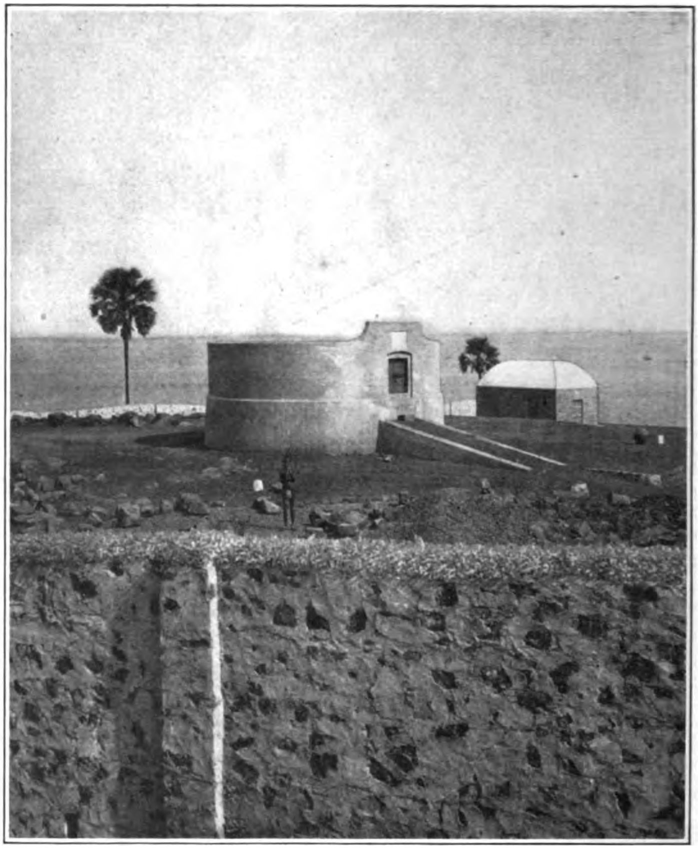
On completing the seventh round the twist is tied seven times over the joined hands of the couple, as well as round the double knot of the ends of the cloth previously put about them. When this is over incense is burnt on a fire placed in a flat metallic vase, after which the curtain is suddenly dropped down and the bride and bridegroom, who have each been provided with a few grains of rice, hasten to throw them at one another. This is followed by a clapping of hands from the ladies seated around the bridal pair, and the applause is taken up by the gentlemen outside.

After throwing the rice the couple sit side by side, when the recital of "ashirwad," or blessings, by two "dasturs," or chief priests, follows; one of these stands before the bride and the other before the bridegroom.

The holding of the curtain between the bride and the bridegroom and its subsequent removal are meant to show that up to the time of the ceremony they were separated from each other, but that they are so no longer. Their being made to sit opposite to one another at first and side by side a little later on also expresses the same notion. The grasping of their right hands by each other and their being tied by a string signify that they are thenceforth united. The putting round of the string and the cloth, so as to encircle them with a double



A Parsee Wedding

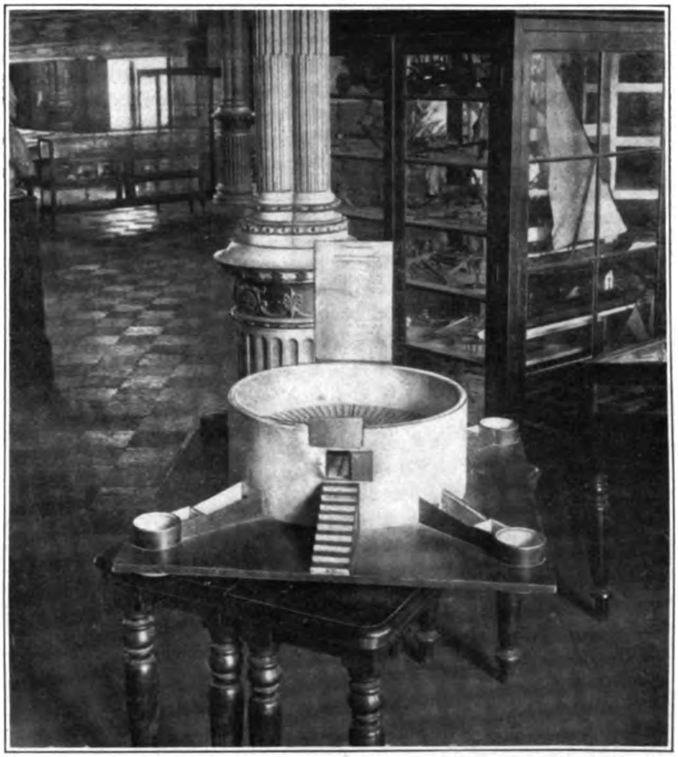


The Tower of Silence and Fire Temple at Uran

The photograph was taken from a rock in the cliffs of the overhanging mountains by an artist especially sent out by Messrs Underwood & Underwood, of New York. The Tower has been but recently dedicated, and hence the grounds are yet unimproved. The wall, capped with broken glass, that surrounds the grounds is noticeably in the foreground. The Tower is not a large one. The inclined pathway to the door that admits the corpse and pall-bearers is very distinctly shown. The oblong white arched-roofed building to the right, near a targola palm, is a small Fire Temple, where the sacred fire is ever burning, and is used by the mourners for prayers.

knot at the ends, means that they are now joined and made one. The object of using raw twist, and of its being put round them seven times, is to show that while raw twist itself can be very easily broken, when it is strung round seven times and twined into one it forms so strong a band that it cannot be broken by ordinary strength, thus implying that the love and affection of the husband and wife for each other should be so strong that nothing can undo it.

The reason for the twist being strung round seven times is because this number is held to be very auspicious among the Parsees, there having been seven archangels, seven heavens, and seven continents known to the ancient Per-



A Model of a "Tower of Silence"

This model gives a fair idea of a Tower of Silence; the circular wall, steps, drainage wells, the door, and also the inside construction are exactly represented in miniature.

sians. Lastly, the throwing of a few grains of rice upon each other is watched with much interest by the friends and relations of the bride and bridegroom.

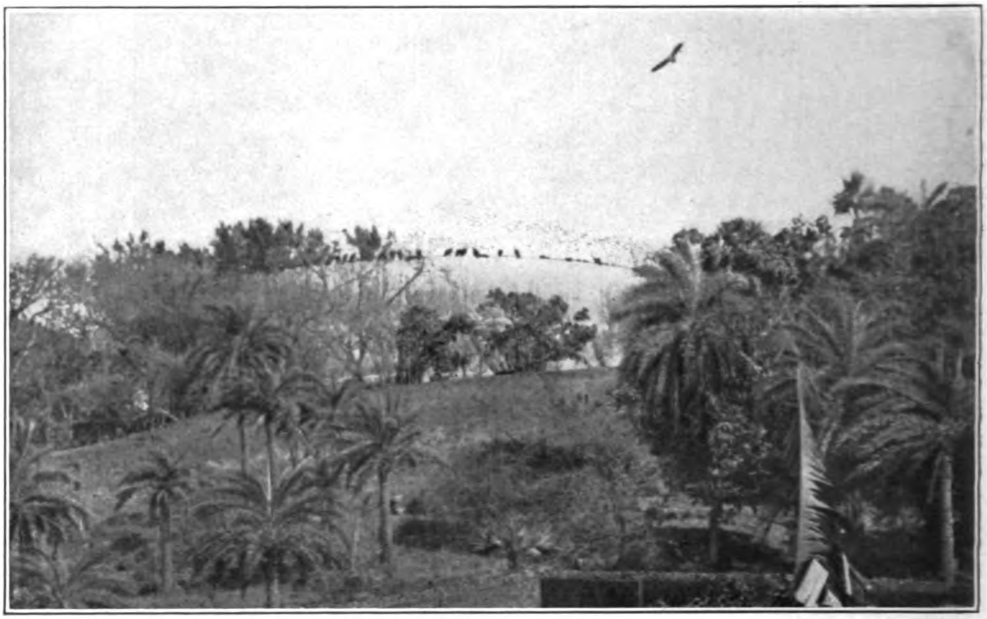
The eyes of all, particularly of the ladies, are upon the pair to see which succeeds in throwing first the rice as soon as the curtain is withdrawn. The one who succeeds is supposed to evince the more love and affection of the two.

Then the senior "dastur" begins the more solemn part of the marriage ceremony, and pronounces the following blessing: "May the omniscient Lord bless you with many sons and grandsons, with good livelihood, heart-ravishing friendship, and an existence of one hundred and fifty years."

Portions of the brief address which follows the blessing are given below.

By the helping name of Ahura Mazda may your happiness increase.
May you be brilliant.
Try to do good deeds.
Be increasing.
Be victorious.
Learn to do good deeds of piety.
Be worthy to do good deeds.
Think of nothing but the truth.
Speak nothing but the truth.
Do nothing but what is proper.
Shun all bad thoughts.
Shun all bad words.
Shun all bad actions.
Praise deeds of piety.
Commit no acts opposed to piety.
Praise the Mazdayasnan religion.
Do nothing without mature consideration.
Acquire wealth by good means.

Say what is true before your superiors, and act according to their orders.
Be courteous, sweet-tongued, and kind toward your friends.
Do not indulge in scandals.
Avoid being angry.
Do not commit sins for the sake of avoiding shame.
Do not be ambitious.
Do not torment others.
Do not entertain wicked jealousy.
Do not be naughty.
Treat your friends in a way agreeable to them.
Do not enter into any discussion with persons of illfame.
Speak in an assembly after great consideration.
Speak with moderation in the presence of kings.
Preserve the good name of your father.
In no way annoy your mother.
Keep yourselves pure by means of truth.
Be immortal like Kaikhosru.
Be well-informed like Kaus.
Be as brilliant as the sun.



From Stereograph, copyright, by Underwood & Underwood

Tower of Silence

Where vultures devour the Parsi dead, Malabar Hill, Bombay, India.

Avoid evil thoughts.
Avoid evil passions (revenge).
Deprive not others of their property.
Keep away from the wives of others.
Be industrious in following good professions.
Do good to the pious and to the virtuous.
Do not quarrel with the revengeful.
Never be a partner with an ambitious man.
Do not become a companion of a backbiter or a scandal-monger.
Do not join in company of persons of illfame.
Do not coöperate with the ill-informed.
Fight with your enemies only by fair means.
Be as pure as the moon.
Be as illustrious as Zarthosthra.
Be as strong as Rustam.
Be as fertile as the earth.
As soul is united with the body, so be you united, friendly with your friends, brothers, wife, and children.
Always keep good faith, and preserve a good character.
Recognize only Ahura Mazda, the omniscient Lord, as your God.
Praise Zoroaster as your spiritual leader.
Treat Ahreman, the evil spirit, with contempt.

When the ceremony has been concluded the bridegroom, accompanied by his friends, retires to his own house, where they all sit down to a banquet. The bride's party are entertained by her father. The ladies are first served, and when they have left the table it is prepared for the gentlemen.

The Parsees, from their earliest sojourn in India, have refrained from eating meat on the day of marriage, to avoid giving offense to the feelings of the Hindoos. The viands, therefore, consist of fish, vegetables, sweetmeats, fruits, preserves, and similar articles. Wines are drunk freely, and several toasts are proposed by the company, including the health of the wedded pair, their parents, and the chief men of the assembly. After dinner the ladies retire to their own houses, but the gentlemen sit till a late hour enjoying the pleasures of a "natch," or of a band that follows. A repetition of the nuptial benediction is also performed by the priests after midnight before a few select friends and relatives.

As the couple are invariably young, separate accommodation is seldom allotted them after their marriage, nor even when they have attained adult age do they leave the parental roof. They live in the same house with the other members of the family.

Though a father has six or seven sons they all reside, with their wives and children, in the house of their sire, and the gray-headed old man is often able to look with pride and pleasure upon the group of children and grandchildren around him.

THE TOWERS OF SILENCE

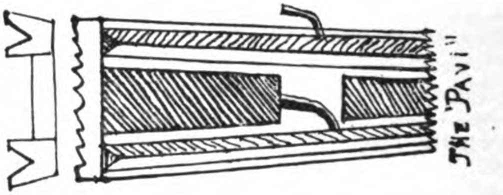
Mr John Fryer, who arrived in Bombay in the year 1671, says in his book of travels: "On the other side of the great inlet to the sea is a great point abutting Old Women's Island, and is called Malabar Hill; a rocky, woody mountain, yet sends forth long grass. At the top of all is a Parsy tomb, lately reared. On its declivity, towards the sea, the remains of a stupendous pagod, near a tank of fresh water, which the Malabars visit it mainly for." This "Parsy tomb," or "dokma," as it is called in the vernacular, still exists on Malabar Hill.

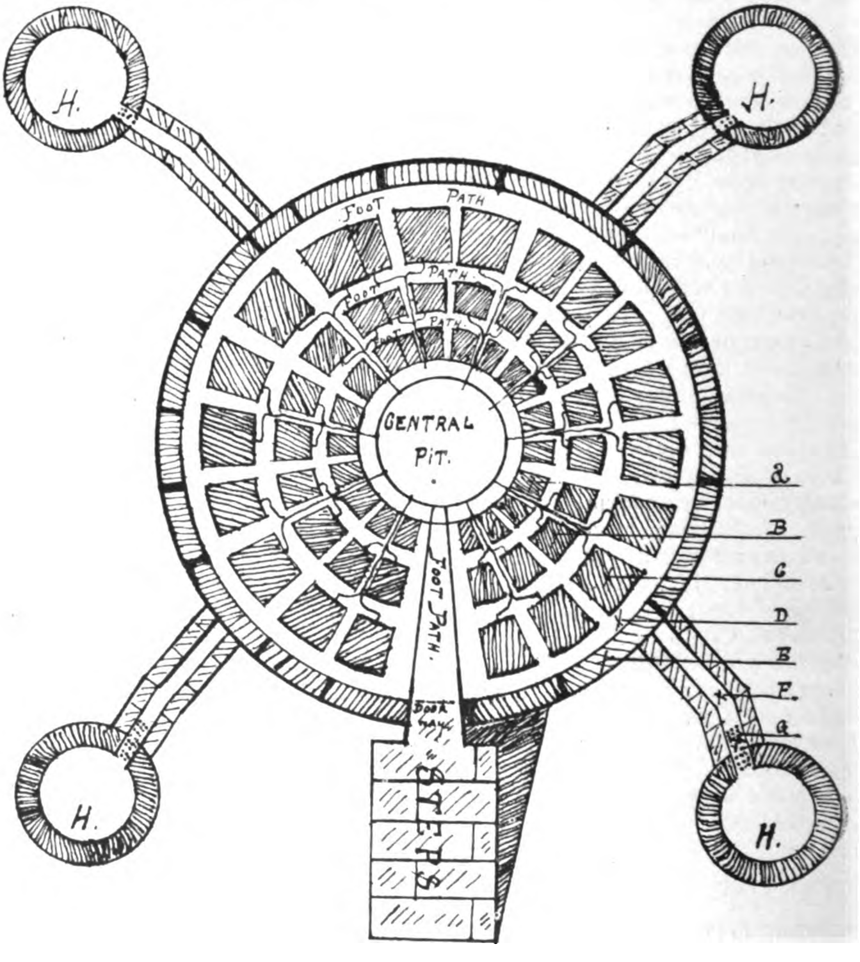
In accordance with religious injunctions, the Parsees build their Towers of Silence on the tops of hills, if available. No expense is spared in constructing them of the hardest and best materials, with a view that they may last for centuries, without the possibility of polluting the earth or contaminating any living beings dwelling thereon.

On Malabar Hill, a long, prominent, rocky ridge, paralleling and overlooking the Arabian Sea, are built the "Towers of Silence." They are five in number, the one mentioned by Dr Fryer now more than 230 years old; another for the use of suicides only, and three others.

They are surrounded by about sixteen acres of ground, artistically laid out and planted with beautiful flowers and tropical plants. Just inside the entrance gate is a peculiarly constructed building, set apart for a fire temple and a house of prayer. These "Dokmas," or "Towers of Silence," are built upon one plan, but their size may and does vary. The largest of them measures 276 feet in circumference, or about 90 feet in diameter, surrounded by a circular wall, 20 to 30 feet in height, built of the hardest stone, and faced with chunam or white plaster. There is an opening or door just above the ground level, through which the dead bodies are carried by professional corpse-bearers, who have gone through certain religious ceremonies and who are alone privileged to carry the corpses into the tower. No one else can enter or touch them.

That an intelligent idea may be given I have annexed hereto a ground plan of a tower of silence. Inside the tower




H.
H.
H.
H.
FOOT PATH
FOOT PATH
FOOT PATH
CENTRAL PIT.
FOOT PATH.
DOOR WAY
STEPS
a
B
C
D
E
F.
G

Ground Plan, Towers of Silence, Malabar Hill, Bombay

a. Row of Pavi for children.
b. Row of Pavi for females.
c. Row of Pavi for males.
d. Foot paths.
e. Outer wall.
f. Underground drain.
g. Charcoal filter.
h. Undergronnd well

is a circular platform, about 270 feet in circumference, and entirely paved with large stone slabs, and divided into three rows, called "pavis," for the bodies of the dead. As there are the same number of pavis in each concentric row, they diminish in size from the outer to the inner ring.

THE DISPOSAL OF THE DEAD

The outside row is used for the bodies of males, the next for those of females, and the third or inner row for those of children. These receptacles or "pavis" are separated from each other by ridges called "dandas," which are about an inch in height above the level of the pavis, and channels are cut into the pavis for the purpose of conveying all the liquid matter flowing from the corpses and rainwater into a "bhandar" or a deep hollow, in the form of a pit, the bottom of which is paved with stone slabs. This pit forms the center of the tower.

When the corpse has been completely stripped of its flesh by the vultures, which is generally accomplished within an hour at the outside, and when the bones of the denuded skeleton are perfectly dried by the powerful heat of a tropical sun and other atmospheric influences, they are thrown into this pit, where they crumble into dust, the rich and poor thus meeting together after death in one common level of equality.

Four drains are constructed leading from the bottom of the pit. They commence from the surrounding wall of the bhandar and pass beyond the outside of the tower into four wells sunk in the ground at equal distances. At the mouth of each drain charcoal and sandstones are placed for purifying the fluid before it enters the ground, thus observing one of the tenets of the Zoroastrian religion, that "The mother earth shall not be defiled." The wells have a permeable bottom, which is covered with sand to a height of 5 to 7 feet.

However distant may be the house of a deceased person, whether rich or poor, high or low in rank, he has always a walking funeral. His body is carried to the Towers of Silence on an iron bier by official corpse-bearers, and is followed in procession by the mourners, male relatives, and friends, dressed in white flowing full-dress robes, walking behind in pairs, and each couple joined hand in hand by holding a white handkerchief between them in sympathetic grief.

This mode of disposing of the dead, which the Parsees have practiced for countless generations, is repulsive to the sentiment of nations accustomed to bury their dead in the ground ; but it is thoroughly sanitary, and clears away most effectually one of the greatest difficulties encumbering 'the path of sanitary reformers in great cities.

According to their religion, earth, fire, and water are sacred and very useful to man, and to avoid their pollution by contact with putrefying flesh, the faith strictly enjoins that the dead bodies shall not be buried in the ground, burnt, or thrown into the rivers or sea. They further claim that it really carries out the doctrine of the equality of man more satisfactorily than burying or burning, since the bones of the whole community, rich and poor, rest together at last in the well within the Tower of Silence.

A dismal impression is made at first thought upon the foreigner by these towers, where absolute silence has reigned for centuries, and where, within the last half century, more than fifty-thousand Parsees have been exposed.

THE VULTURES

It is estimated that some five hundred vultures make their homes in the lofty tropical palms in the gardens that surround the towers, and when a corpse is exposed in one of them they swoop down and do not rise again until all the flesh has been devoured. Within its silent precinct they are secluded and free from all outside interference, and I have been told by those who have watched for the purpose that they never rise to the top of the tower with any substance whatever. They are disqualified by the form of their weak, little curved, unretractile talons from seizing or carrying away living prey.

These birds lay two eggs at a time, and are said to produce but once a year. Like the American eagle, they build their nests in inaccessible rocks and places remote from the hands of man.

These jackals of the air are large in size and have remarkably keen sight. They have naked heads and necks, a broad, powerful, hooked bill, and strong, thick legs. They are gregarious, slow in flight, gluttonous of habit, and prefer carrion to living prey.

In view of the fact that the corpses of all Parsees, regardless of the cause of death, even of the most contagious fever, smallpox, Bombay plague, or cholera, are thus exposed in the towers, it is remarkable that these vultures have never been known, so far as investigation can determine, to spread the contagion or suffer from it themselves. When all is over they come to the top of the towers, where they sit for hours without moving.

There is nothing of a sacred character ascribed to the birds which admirably perform this disgusting though useful work in the economy of nature. The fact is that there is no unpleasant taint of this charnel-house in the grounds about the towers, there being not the faintest odor of death to mingle with the perfume of the flowers blooming in this beautiful garden.

Europeans may regard the Parsee system as barbarous and repugnant to civilized ideas. The Parsees are quite as much justified in so regarding our system of sepulture. The undoubted fact remains that from the sanitary aspect the Parsee system is infinitely the better of the two. True, we do not like to think of the vultures hovering around the funeral procession for the last few miles, or of others awaiting it, perched on, and greedily gazing down into, the tower. Their system is at all events the more perfect solution of the sanitary side of the question, especially in this hot and moist tropical climate. Death is a solemn reminder of the equality of all men before the law of nature, and their mode is an efficient preventive to post-human distinction, vanities and funeral pomp.

CHINA AND THE UNITED STATES*

BY SIR CHENTUNG LIANG-CHENG, K. C. M. G.

ENVOY EXTRAORDINARY AND MINISTER PLENIPOTENTIARY FROM CHINA TO THE UNITED STATES

FROM the earliest intercourse of the United States with China, the relations between our two countries have been of the friendliest character. When the governments of Europe in the past century, singly or in combination, took aggressive action against China, the United States always refrained from acting with them or following their example. But especially since the days when your distinguished citizen, Anson Burlingame, after having represented the government of the United States at the court of Peking, served so ably as the ambassador of the Imperial Chinese government in making a series of treaties with foreign powers, and particularly the treaty of 1868 with your government, we have been drawn more closely together.

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* An address to the Commercial Club of Chicago, November 11, 1905.

The constant policy of your government in regard to the affairs of the Far East has been one of conspicuous magnanimity and justice. This was amply manifested in the settlement of the difficulties of 1900 and throughout the negotiations with the powers in the following year. I recall with unspeakable pleasure the conduct of President McKinley at that time, through whose wisdom and forbearance my country was saved much humiliation. The policy which he marked out was followed by his successor, President Roosevelt, whose fairness and high sense of justice have been always evinced toward us. Nor can I fail to mention the friendship and protecting care of that eminent and lamented statesman, John Hay, Secretary of State. For these reasons the Chinese, as a government, are under a deep sense of gratitude, and, as a people, are naturally most friendly inclined toward the government and people of the United States. Hence it was that I experienced a feeling of no little satisfaction when I was honored with the mission to represent the country of my birth in the country of my education.

The subject about which doubtless you would be glad to hear from me—the commercial possibilities between the two countries—is one respecting which the members of the Commercial Club, with their long experience and keen judgment, are better judges than myself. But I cannot fail to see that, as China is brought more and more closely in contact with foreign countries, as the people come to learn the necessities, the conveniences, and the comforts enjoyed by the people of other lands, as by travel, by education, by long residence abroad, her demand for foreign commodities will be largely increased. China is not, to a great extent, a manufacturing country; nor is she likely to be in the near future. Her people are too easily satisfied with what they can readily purchase in the world's markets. Nor are her people, who have enjoyed art, culture, refinement for centuries, disinclined to modern luxuries and conveniences. The present foreign trade in that ancient empire is chiefly confined to the coast provinces. It is anticipated that the abolition of the likin tax, as provided in the recent commercial treaties, when fully carried out, will forever destroy that formidable barrier to internal commerce so long deplored by merchants, both foreign and native alike. When her immense natural resources shall have been developed, her purchasing power will indeed be greatly increased.

It is this commercial growth I long to see established between the two countries, and it has been my pleasure, as well as my duty, to smooth all differences which might threaten its complete realization. But there is one difference now engaging the serious attention of the two governments which I may be pardoned for bringing to your attention. The exclusion question and the administration of the exclusion laws are matters which seem to have engaged very little the consideration of the American people; but they are matters of vital importance to the Chinese directly concerned. While I wish it to be understood that it is not my intention to unduly criticise the laws or the administration of the laws, the mention of some facts may aid you in a proper consideration of this question, which has a direct connection with the improvement of our commercial relations.

When the American Commissioners went to Peking to negotiate the immigration treaty of 1880, in the first memorandum which they submitted to the Chinese plenipotentiaries in setting forth the object of their visit, they stated that the restriction they desired was "entirely of laborers." An examination of their detailed negotiations, which were fully reported to their government, will show that they made no other demands. After receiving most sacred assurances that the restriction shall be "reasonable, and not absolute prohibition," the Chinese government gave consent to the American government's demands. This was considered at the time by the American Commissioners, as their official reports show, as a concession from the Chinese government without any *quid pro quo*. The Chinese government had good reason to believe that the question would be handled with due leniency, and that the American people would not take advantage of their good nature.

Fourteen years elapsed, and the American government by resolution of the Senate again sought to negotiate a modification of the treaty with the Chinese government. The treaty of 1894, which expired December last by limitation, containing a provision that no Chinese laborer shall enter the United States, was the result. It should be stated that there is no indication in this resolution that the Senate desired the exclusion of any other class of Chinese than laborers. It is evident that the object of the American government was to secure, and the consent of the Chinese government was given to, the prohibition of Chinese laborers only, and no other class. During more than a score of years of restriction and prohibition, abuses have sprung up on both sides. Time will not permit me to enumerate the numerous cases of hardship and unjust treatment of which the exempt classes of Chinese have been made the victims because of the overzealousness of some United States government officials in discharging their duty in keeping out the prohibited class of Chinese. Suffice it to say that prior to the President's order of last June it had so stirred up the feeling of the Chinese people that the boycott against American goods was the regrettable consequence.

In compliance with the wishes of the American government, the Chinese government has issued an imperial decree, warning the people to respect every treaty stipulation under penalty of severe punishment, and urging them to suppress the boycott pending action of Congress to relieve the situation, and the provincial authorities have issued similar proclamations. The Chinese government, while viewing with concern the exclusion of Chinese laborers under undue discrimination is, nevertheless, not unwilling to take into consideration the condition of things alleged to exist in this country. But aside from the laboring class, all other classes should be admitted, and should receive the same treatment as is accorded to similar classes of Europeans entering this "land of freedom." As the laws and the immigration regulations stand today, aside from the five classes named in the expired treaty of 1894, namely, students, merchants, teachers, travelers, and officials, the following classes of Chinese cannot enter the United States, to wit, bankers, lawyers, journalists, priests and the clergy, physicians, dentists, insurance agents, brokers, and traveling commercial agents. Nothing was farther than this from the thought of the original negotiators.

In fact, the laws on the subject seem to be in such a state of hopeless confusion that different attorneys-general have rendered conflicting opinions as to the meaning of certain vital requirements, with the result that the regulations, which should be intended merely to carry into effect the provisions of the laws, impose conditions additional to the laws and unwarranted requirements, which have the force of legal enactments. In consequence Chinese subjects have been made to suffer great hardship in their attempt to land in the United States, and after being admitted they have been incessantly harassed by immigration agents of the government with domiciliary visits and unreasonable interruptions while pursuing quietly and peaceably their lawful vocations in this country. True, every nation has the supreme right to make its own laws, but it is liable to be held accountable in some future day for any wrong done thereby to the subjects of foreign governments. Any new settlement of the exclusion question, therefore, in order to satisfy the Chinese government and to be in accord with the dignity and sense of justice of this great American republic, must have regard to the unsatisfactory manner in which the laws and regulations relating to Chinese immigration, made in pursuance of treaty stipulations, have been administered, and should correct the abuses that have gradually sprung up, which render the present state of affairs intolerable.

What China asks is only fair play and due consideration, and she can well rely on the justice of the American people and on the wisdom of their law-makers, headed by their illustrious President, who is the champion of peace, of humanity, of just dealing, to bring this important question to a successful settlement and remove the only serious obstacle to the freer development of our commercial relations.

A lamentable event has recently taken place in the murder of several American missionaries in one of the remote localities of China, to which I think it proper to refer. Repeated imperial edicts have recognized that foreign missionaries are lawfully in China; their beneficent work in instruction, hospitals, and charity has been recognized by my government, and the authorities have been enjoined to afford them all possible protection. The cause of the recent mob violence has not yet been definitely ascertained, but the Foreign Office at Peking has hastened to inform the American minister that prompt punishment will be inflicted upon the murderers and full indemnity made for the injuries and losses sustained by the missionaries.

Unfortunately the Chinese government, though influenced by a sincere desire to repress lawlessness, is not always able to anticipate and prevent mob violence; but China is not the only country which is sometimes put to shame by the acts of excited and bad people. It does not excuse the bloody deeds of which the missionaries are the sufferers to say that more Chinese subjects have been cruelly murdered by mobs in the United States during the last twenty-five years than all the Americans who have been murdered in China by similar riots, but it may in some degree palliate the shocking crimes in China. I cannot, however, refrain from saying that in every instance where Americans have suffered from mobs the authorities have made reparation for the losses, and rarely has the punishment of death failed to be inflicted upon some of the guilty offenders. On the other hand, I am sorry to say that I have not been able to recall a single instance where the penalty of death has been visited on any member of the mobs in the United States guilty of the death of Chinese; and in only two instances of mob violence out of many has indemnity been paid by the authorities for the losses sustained by the Chinese.

I am free to say that the United States government has on many occasions exerted its power and authority to secure punishment of the criminals through the courts, but public opinion in the localities has been so strongly against the Chinese that all the murderers have escaped punishment. Let us hope that a better day is coming for our respective peoples, and that the civilization and humanity of both nations will prevail over barbarism and savagery.

WHAT HAS BEEN ACCOMPLISHED BY THE UNITED STATES TOWARD BUILDING THE PANAMA CANAL*

By Theodore P. Shonts

Chairman of the Isthmian Canal Commission

WHEN I received Vice-President Lupton's invitation to come before your association and talk on the Panama Canal, I accepted it with pleasure because of the opportunity it afforded of talking to business men in a business way of what is a great business project. As I view it, the building of the Panama Canal is a business, not a political, proposition. I propose, in what I have to say to you, to talk as a practical man to practical men who are themselves engaged in large commercial enterprises and who know from experience the difficulties to be met and the enormous amount of thought and labor involved in the inauguration of great undertakings in the United States. You will be able to appreciate, therefore, how every difficulty was aggravated in an enterprise of the magnitude of the Isthmian Canal, in which the preparatory work had to be carried on 2,000 miles from the base of supplies. But this is not all. The work had to be done in a hostile climate and under health conditions which, through centuries of neglect of all sanitary principles, had become a menace to the lives of all persons save natives of the tropics.

In order, therefore, to make the Isthmus a place fit to live in and to work in, there were three fundamental tasks which had to be performed in advance of all others:

First. Thorough sanitation of the Isthmus.

Second. Providing suitable habitations for all classes of employés.

Third. Providing a system of food supply which would afford to all employés opportunity of obtaining wholesome food at reasonable cost.

First. In regard to sanitation: When the United States began this work there were no systems of water works, of sewerage, or of drainage on the Isthmus. The people depended largely on unprotected cisterns for their water supply, filled during the rainy season, and on barrels filled from neighboring streams, all breeding places for mosquitoes. The filth of ages had accumulated around the dwellings and in the streets, undisturbed except when washed away by torrential rains. Pools of stagnant water had existed for years in proximity to dwellings, and insect-breeding swamps lay undrained adjacent to the cities and many of the towns. Seventy per cent of Panama is now supplied with pure mountain water, fed from a storage large enough to furnish sixty gallons per day to each inhabitant after its present population shall have increased one-half. Fifty per cent of a complete modern sewerage system has been installed, and work on the remainder is being carried rapidly forward. The first million of brick for paving its streets are on the ground. The city has been fumigated time and again, first house by house, to stop the spread of disease, and again as a unit—that is, the entire city at one time. A large force is just finishing a thorough cleaning of the city—the first scrubbing it has had during its centuries of existence; and Governor Magoon, under whose jurisdiction all this work has been so successfully accomplished, is arranging to raze many of the worst shacks and replace them with modern sanitary buildings. Within a year, it may confidently be predicted, Panama will be a city well watered, well sewered, well paved, and clean and healthful.

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*An address to the American Hardware Manufacturers' Association, Washington, D. C., November 9, 1905.

What has been done for Panama is being done for Colon and every important labor camp across the Isthmus. Work on Colon's water reservoir is well under way, and temporary measures are being employed to safeguard the city's health pending the report of a board appointed to recommend plans for permanent improvements. An abundant supply of pure water from mountain springs has been provided at Culebra and at other important labor centers along the line of the canal, and adequate drainage is being installed in them also.

Four thousand one hundred men are now employed in these sanitary undertakings. So effective has been the work that yellow fever has been virtually extirpated from the Isthmus. In June last there were 62 cases of yellow fever there; in July, 42; in August, 27; in September, 6, and in October, the worst month of the year for yellow fever, 3—no one of the latter among the employés and all originating many miles from the line of the canal. In regard to general health conditions, I was told, when on the Isthmus in October, that there were over a hundred less patients in Ancon Hospital than there had been for many months, although we had brought in 4,000 additional laborers during the previous two months, and it was from the new arrivals that the hospitals were usually recruited.

To fully understand what has been accomplished by our sanitary work, it is only necessary to compare the present rate of sickness with that which prevailed on the Isthmus when the French were in possession. In August, 1882, the second year of the French occupancy, with a force of 1,900 men, the death rate was 112 per 1,000. In August, 1905, with a force of 12,000 men, there were only eight deaths, or two-thirds of a man per 1,000.

If we have not, as our critics complain, made "the dirt fly," we have made the filth fly, and we have made yellow fever, that supreme terror of the tropics, fly so far from the Isthmus that it will never, let us hope, find its way back again.

We have established a hospital system which includes a large hospital at Colon and another at Ancon, and a number of smaller hospitals at convenient points along the line. The one at Colon is built on piers over the Atlantic Ocean, and patients there have at all times the benefit of cool and invigorating sea air. That at Ancon is one of the largest and best equipped in the world, situated on the hill above Panama and commanding a superb view of mountains and sea.

The management and service of the hospitals are on a par with the natural advantages and beauty of location. Colonel Gorgas, who is in direct charge of hospitals, has organized a staff of doctors and nurses for which it would be difficult to find a superior anywhere. Mr Isham Randolph, one of the members of the consulting board of engineers, who recently visited the Isthmus, said, in a letter published on his return: "The hospitals are a source of just pride to our people. If sickness could ever be regarded as a boon, it may be so thought of in Ancon and Colon." No less emphatic testimony comes from Mr D. M. Hazlett, who speaks from personal experience as a patient in Ancon Hospital. Writing in the Panama *Mail*, he says: "The medical staff and corps of trained nurses are beyond criticism. No expense has been spared in providing the various wards with all the conveniences which science and experience can command. There is probably no institution in the world where patients receive better treatment or more faithful service than in Ancon Hospital."

Second. In regard to providing quarters for the employés: The commission inherited from the French company more than 2,100 buildings, all in bad condition. During the past year 649 of them have been repaired, 58 new buildings have been erected, and 67 more are in course of construction; two new hotels, three stories high and containing from 55 to 60 rooms each, have been completed, and authority has been granted for eight others, a portion of which are under construction at the present time. Work is in progress also on cottages for married employés and on bachelor quarters. In this work of construction 2,400 men are employed, and additional carpenters are being sent out with every steamer. This work is being pressed forward with the utmost vigor.

Third. In regard to food supplies: This was the most serious problem that confronted us. If we couldn't feed the men, we couldn't build the canal. Owing to the fact that the natives never look beyond their present necessities, no surplus food supply ever accumulates. This normal condition of no surplus was greatly intensified by the almost total failure of the crops for the two preceding years, by the abandonment by agricultural laborers of their farms back in the hills for work on the canal, where they received higher pay for shorter hours, and by quarantine against the port of Panama on account of bubonic plague, which prevented the arrival of foodstuff from neighboring provinces.

We were thus brought face to face with the problem of feeding twelve thousand (12,000) men, with base of supplies 2,000 miles away.

We immediately arranged to open local commissary stores at every important labor camp, to provide mess-houses, and to furnish food, both cooked and uncooked, to all employés at cost. We cabled orders to have our steamers equipped with refrigerating plants; we arranged for the erection of a temporary cold-storage plant at Colon, and we purchased refrigerator cars for immediate shipment to the Isthmus, thus establishing a line of refrigeration from the markets of the United States to the commissary stations of the Isthmus. We also purchased from individual lessees the equipment in existing hotels and assumed their management ourselves. The net result of these efforts is that today we are affording to all employés opportunity to obtain an abundant supply of wholesome food, cooked and uncooked, at reasonable prices. The silver men—by which I mean the common laborers—are being fed for 30 cents per day, and the gold employés—by which I mean those of the higher class—at 90 cents per day, and it is good food in place of bad. There may be dispute about the blessing of tainted money, but there can be none about the curse of tainted food.

But in addition to these fundamental tasks of improving the health conditions on the Isthmus and providing for the physical comfort and well being of all classes of employés, another essential preliminary to actual canal building has been receiving our earnest attention. I refer to the enlargement and improvement of our facilities for receiving and distributing the immense quantities of materials and supplies which will enter into the construction of the canal, as well as into the work referred to. The only really valuable instrument essential to canal building acquired by our government in its purchase from the French was the Panama Railroad. But this instrument, like all the others whose wrecks cover the Isthmus, had been neglected and its equipment allowed to become obsolete. If the docks, wharves, warehouses, terminal yards, locomotives, and cars of the Panama Railroad had been in good repair, which they were not, they still would have been entirely inadequate to properly care for and handle the small commercial business the road was transacting. The existing facilities, poor as they were, were rendered less efficient by the entire absence of any mechanical appliances on the docks to assist in receiving or discharging the steamers' cargoes. The negro laborer was the only power employed; he was at once the only hoisting machine and the only traveling crane in use. Imagine, then, the congestion which necessarily ensued when the accumulated orders in the states began to arrive in large quantities on both sides of the Isthmus. To aggravate the situation, while the deluge of arriving material was at its height, the commercial business of the road increased nearly 50 per cent over the year before; and at the moment when we thought affairs could get no worse, two cases of bubonic plague at La Boca resulted in two consecutive quarantines at that place, completely tying up that outlet for 60 days. Furthermore, the personnel of the Panama Railroad as acquired had not been educated on modern lines, and therefore was completely paralyzed when confronted with the onerous conditions caused by this congestion. It was necessary, consequently, to begin at once the construction of new wharves equipped with modern mechanical appliances, and of large terminal yards at both ends of the road; of extensive warehouses; of suitable machine shops, and of a modern coal hoisting plant, which will reduce the cost of handling coal from ship to engines from $1.30 to about 12 cents per ton.

We have also purchased new and more powerful locomotives, larger cars for both passenger and freight services, and heavy steel rails for relaying the road, and have strengthened the bridges to enable them to carry the heavier equipment. We have reorganized the personnel of the road, putting into the higher positions experienced, aggressive, up-to-date men, with the result that with the old equipment and facilities they have cleared up during the last thirty days an accumulation of over 12,000 tons of commercial freight. With the advent of our increased dock facilities, terminal yards now nearly complete, and new power and equipment now arriving, the road will be in a position to handle efficiently and economically a vastly larger volume of business than heretofore.

While all this necessary work was in progress the task of purchasing, forwarding, and distributing the enormous quantity of materials and supplies of all kinds was receiving our constant and most careful attention. The purchases included not only the items entering into the permanent plant, but also those required for the preliminary work. To give you an idea of the magnitude of these purchases I will read for you the principal items:

61 steam shovels.
1,300 flat cars.
12 rapid unloaders.
22 unloading plows.
13 earth-spreaders.
324 dump-cars.
12 hoisting engines.
120 locomotives.
5,000 tons of steel rails.
125,000 cross-ties.
12,000 pieces of piling.
14 air compressing machines.
3 cranes.
152 rock-drills.
30,000,000 feet of lumber (approximately).
2 dipper dredges.
646,000 pounds blasting powder.
617,500 pounds dynamite.
7,000,000 paving brick.
3,500,000 building brick.

500,000 square feet roofing tile.
36,000 barrels cement (approximately).
3 steel water tanks and towers.
12 stand pipes.
2 ocean steamships.

The approximate total cost of our purchases was about $9,000,000. It should be borne in mind that at the time when orders for most of these items were placed the industries of the United States were crowded with domestic business and were unable, consequently, to make prompt deliveries. It should be borne in mind, also, that after machinery had been manufactured here and set up, it had to be taken apart, shipped two thousand miles over steamship lines already taxed to their full capacity, and on arrival on the Isthmus had to be again set up before ready for use. Then, too, on account of many reports as to the prevalence of yellow fever on the Isthmus, it was very difficult at a critical time for concerns furnishing material to get steamers to take it there, because of fear that their crews might become infected and their vessels might be quarantined when they wished to return to the United States. Finally, the steamers of the United Fruit Line from New Orleans, which had been carrying a considerable amount of the freight going to the Isthmus, were put out of service on account of yellow fever in that city.

To the various causes of delay mentioned is to be added the requirements of law, that all bids for materials used in government work shall be advertised for. This compels a delay in all cases of from ten to thirty days.

Furthermore, in addition to the purchases for the canal, the following have been ordered for the Panama Railroad:

500 box cars—40-ton.
12 caboose cars.
10 refrigerator cars.
6 passenger coaches.
24 locomotives.
2 wrecking cranes.
1 locomotive crane.
1 pile-driver.
3 track scales—100-ton.
1 modern coal-hoisting plant.
1 cantilever crane for coal-hoisting plant.

In regard to all equipment purchases, both for the canal and the railroad, it should be stated that the gauge of the Panama Railroad, being wider than the standard gauge in the United States, made it impossible to use second-hand rolling stock of any kind; all locomotives and cars had, therefore, to be built to order. After the supplies reached the Isthmus we had to contend not only with the lack of terminal facilities and mechanical appliances already mentioned, but also with an inadequate equipment with which to distribute it to its destination or the force to handle it. These obstacles have been largely surmounted. The elimination of yellow fever and the establishment of better systems of housing and feeding the employés have enabled us to recruit our working forces till those assigned to the material and supply division now number over 2,100 men.

I have so far, gentlemen, endeavored to give you an idea of the difficulties which we have had to encounter and overcome in order to make the Isthmus a place fit to work in and to collect the tools with which to work. So far as actual excavation and dredging are concerned, we have not endeavored to accomplish much. As a general principle, in which I think you will all concur, it is inadvisable to attempt to run a railroad before the tracks are laid. We are now working, however, six steam shovels in Culebra Cut, which is the largest single factor in the construction of the canal, and have removed approximately 1,000,000 cubic yards of material. By this work we are accomplishing two things: First, we are putting the levels of the cut in proper condition for the installation of the largest number of machines which can be effectively operated, and, second, we are gathering data which will be useful in future estimates of the cost of canal construction. In the Culebra work 2,600 men are now employed. We are also building railway tracks and yards, and are dredging at both ends of the canal, so far as advisable, until the question of type of canal is decided. This should be determined within the next ninety days. It should be understood that all the work we have done is applicable to any type of canal.

The question of labor is a grave and perplexing one. We have advanced far enough to know that we can secure a sufficient supply of labor from the tropics, so far as numbers are concerned. The question of quality is a very different matter. Unless a much greater efficiency can be developed than is secured at present, we shall have to look elsewhere. Probably I can best convey to you a just estimate of the quality of this labor by relating an incident which came under the observation of Senator Millard during his visit on the Isthmus. Sitting on the deck of the steamer *Havana*, he was watching the unloading of a heavy piece of machinery from the hold of the vessel. The tackle got caught in the rigging on the deck above; the foreman in charge of the gang of laborers sent one of them above to free the tackle. The laborer went to the place to which he was sent and did what he was told to do. The foreman, paying no attention to him after he started on his errand, missed him a few minutes later, and looking around for him, discovered him sitting peacefully at the spot to which he had been sent. "What are you doing there?" yelled the foreman. "You told me to come here, sah." "Well, why didn't you come back?" "You didn't tell me to, sah."

It is to this class of labor that we are paying from 80 cents to $1.04 per day in gold, and out of which it is estimated we do not get more than 25 per cent of the efficiency of labor in the United States. This is the kind of labor to which we are compelled to apply the eight-hour law—that is, to aliens, who know nothing of the law's existence until they arrive on the Isthmus. Such application will increase the labor cost of canal construction at least 25 per cent and will add many millions unnecessarily to the total expenditure. *In my opinion, it is a mistake to handicap the construction of the Panama Canal by any laws save those of police and sanitation.* I want to go on record here that the application of the eight-hour law, of the contract-labor law, of the Chinese exclusion act, or of any other law passed or to be passed by Congress for the benefit of American labor at home, to labor on the Isthmus, is a serious error. Over 80 per cent of the employés of the canal will be aliens. A majority of the other 20 per cent employed will be in a clerical or supervisory capacity. The application of these laws on the Isthmus will benefit a very small number of American laborers, but will enormously add to the cost of construction, and American labor at home will have to pay its share of the consequent increase in taxation. As business men, you will understand the force of this statement.

That is the story, gentlemen, of what we have been doing on the Isthmus. In line with this, let me add that Chief Engineer Stevens, a man well equipped for the great task he has undertaken, is preparing three complete sets of plans applicable to as many types of canal, so that when a decision shall have been reached as to what type will be used, no delay in beginning work will ensue. It is our confident belief that by the 1st of July next the plant as purchased will be installed and working to its fullest practical capacity. In other words, by that time the dirt will begin to fly in earnest.

The canal will be built—rest assured of that—and it will be built at Panama. Those two phases of the problem have passed irrevocably from the field of debate. There is an industrious and voluble band of hired Ananiases moving to and fro in the land whose mission it is to deny this. The burden of their song is: "The canal will never be built at Panama, and everybody connected with the enterprise, including the President and commissioners and engineers, is convinced of it." You can hear the members of this band chanting their song, to the accompaniment of their lyres, singly and in chorus, wherever men congregate and wherever a few reporters are gathered together. They are rehearsing for their grand burst of noise when Congress shall have assembled. When they are not rehearsing they are putting the words of their song into bogus interviews and other written forms of newspaper publication, which they are sending forth by thousands from their bureaus of publicity in this and other cities. As one contemplates the output of this singular industry, this factory of fiction, he is moved to say of its guiding spirit as Shakespeare says of Captain Dumain : "He will lie with such volubility, sir, that you would think truth were a fool."

Who is capitalizing this industry? What is the bountiful source of this spouting spring of mendacity? Is it to be found among the friends of an Isthmian canal? Are these supplying funds for the sustenance of such a campaign of misinformation? What interests, except those foolishly dreading the competition of an Isthmian Canal, would put up money to delay and possibly defeat its construction? That there are interests of that kind is not a matter of suspicion or speculation, but of history.

They have been fighting a canal for more than half a century, and they fought it successfully till Theodore Roosevelt, armed with his "big stick," appeared as its champion. From that moment their efforts have been powerless, but they have not yet discovered the fact. They are wasting their energies and their cash, for behind Theodore Roosevelt stand the American people in solid mass and with determined front, shouting as one man: "Give us a canal that will be adequate to meet the demands of the commerce of the world, and give it to us at the earliest possible moment." That, gentlemen, is the command which the Commission, under the inspiring lead of the President, is obeying to the letter. We are building the "Roosevelt Canal."

RUSSIA IN RECENT LITERATURE*

By General A. W. Greely

Chief Signal Officer U. S. A.

At no time in the history of the world have the present conditions and future fortunes of Russia excited more interest and been of greater importance than today. It is therefore thought that the members of the National Geographic Society will deem timely the presentation of the various phases and aspects of Russian life as depicted in two very interesting volumes of Sir Donald Mackenzie Wallace and of Luigi Villari, the latter being an original work.

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*Russia. By Sir Donald Mackenzie Wallace. Ill., maps, pp. xx + 672. 9½ x 6¼ inches. New and much enlarged edition. Henry Holt and Company, New York, 1905. $5.00 net.

Russia under the Great Shadow. By Luigi Villari. Ill., 330 pp. James Pott & Co. $3.50 net.

Wallace's "Russia" is an enlarged edition of a work which, though it originally appeared thirty years since, is yet recognized as a standard authority upon the land of the Czars. Sir Donald's observations of Russia now cover a period of thirty-five years.

The changes in Wallace's book are very few, indicating slight modifications as to discomforts of travel, scarcity of good roads, absence of domestic comforts, and, above all, the continued low state of the clergy.

While stating that the younger priests have aspirations for the future improvement of the people, he speaks of the system as "presenting continual simony, carelessness in religious rites, and disorders in administering the sacrament, thus transforming the service of God into a profitable trade."

Of the original volume the only material changes have been in the treatment of local self-government, but the value of the volume is largely increased by additional chapters on industrial progress, nihilism, socialism, and other revolutionary movements.

With regard to the zemstvo, now of forty years standing, he expresses the opinion that it is destined "to play a great political part in the future." This system of local government has suffered from restrictions on the development of education, through governors' suspending its action, by increasing the representation of the bureaucracy at the expense of the peasantry, from preventive censure as to its publications, and by opposition to its efforts to establish equitable taxation. The zemstvos in late years have improved local conditions materially as to hospitals and asylums, and less so as to primary education, agriculture, roads, and bridges. With its defects, the zemstvo is "infinitely better than the institutions it displaced."

The growth of nihilism and its reaction are carefully treated. Repressive measures failed to check it, the decline being due to the foundation of a liberal party. Nihilism found its warmest partisans among students, whose beautiful theories lacked the power of even suggesting concrete forms. The transformation of nihilism into socialism is attributed to Tolstoi's educational reform, which brought the revolutionists into closer contact with western socialism. The various phases of propaganda, agitation, energetic repression, and of terrorism, with its associated crimes, culminated in the assassination of Alexander II, which discredited terrorism.

The development of manufactures and the creation of a proletariat materially affected the revolutionary movement, which assumed the form of social democracy. Political agitations and trade unions resulted in labor troubles, but the efforts of the government, through legislation and its support of workingmen in labor disputes, failed to control the situation. Father Gapon's connection with labor unions and his subsequent career are discussed, together with his failure as a self-appointed representative of the oppressed people and the leader of a political revolution.

Sir Donald admits his inability to state whether the outcome will be reform or revolution. He outlines Plehve's repressive policy, the demands of the constitutionalists, the aims of the social democrats and agrarians. The liberals counsel peaceful methods, while the revolutionists resort to popular disorders.

Considering a strong man necessary, he says of Witte: "As an administrator he has displayed immense ability and energy, but it does not follow that he is a statesman capable of piloting the ship into calm waters."

The most interesting, if not most important, chapter is on industrial progress and the proletariat. A protective tariff and government support have wonderfully developed manufacturing industries, which, in order of importance, are textile fabrics, articles of nutrition, and ores or metals. In total production Russia ranked fifth among the nations. This tremendous growth has been through M. Witte, who declares agricultural countries economically and intellectually inferior to nations manufacturing commodities. Competition and overproduction led to failures and a commercial crisis, from which Russia was slowly recovering at the commencement of its war with Japan.

With manufacturing industries the urban populations increased, notably of Lodz and Moscow, the latter reaching a million. Big factories with cheaper methods of manufacture are killing rapidly home industries. Whole groups of "industrial villages have fallen under the power of middlemen, who advance money to the working households and fix the price of the products."

There are brief allusions to the industrial workers, especially in connection with their unfortunate material conditions. While the workmen complain of long hours, low wages, arbitrary fines, and brutal severity, yet there are other important evils emphasized—those associated with the barrack system, the company store, and unsanitary surroundings.

As a contrast and supplement to the English view of Russia represented in MacKenzie's volume, is that of "Russia under the Great Shadow," by an Italian, Luigi Villari. His services as correspondent of the London *Times* afforded unusual opportunities for acquiring an excellent knowledge of European Russia. This exceedingly well-illustrated volume, with interesting and often brilliant descriptions, covers the salient points of modern Russia and supplements them by broad generalizations of evident value. Of Russia he says:

"An immense country, rich in natural resources, inhabited by a people who, if primitive and ignorant, have many very fine qualities, strong, capable of the hardest toil, inured to the struggle with nature, brave, intelligent, and religious, has been kept out of the march of progress in a condition of semi-Asiatic barbarism for the sake of impossible schemes of universal dominion."

Of especial interest for the light reader are the chapters on St Petersburg, Moscow, Nijni Novgorod, and the Crimea. To the student or more serious reader may be commended provincial Russia, the industrial development, the working classes, Poland, and the economic situation.

He characterizes St Petersburg as representing "the foreign element of Russian civilization." Its picturesque Alexander's market, or Thieves' bazar, is happily described.

Moscow, he says, sums up the essence of many distinct civilizations. It still remains a living force, while presenting every aspect of Russian life, every phase of Russian history. As a holy city second only to Kiev, it has innumerable miracle-working images, which are regarded with the deepest veneration. The Iberian Virgin, where the Czar invariably pays his devotions, is noted for its great popularity, which is utilized as a valued source of income to the church. Per contra is the Moscow University a plague spot of liberalism, vexatious to the government and not favorable to advanced instruction, owing to censorship and frequent closing by the government. On this point Villari says Russia is especially cursed with an intellectual proletariat, with indigent students, insufficiently clothed and depending on benevolent societies and scholarships. He adds:

"These students and graduates overflow the offices and liberal professions and become the most active agents of revolutionary propaganda. One finds, indeed, glaring contrasts among the Russian educated classes between advanced and daring ideas and complete ignorance of matters which are common knowledge to the rest of Europe. Side by side with the most revolutionary doctrines that would shock the most advanced of English or French radicals, there are students, like one whom I met last autumn, who simply refuse to believe that such a thing as religious freedom exists in any country in the world. These incongruities are but the result of the system of repression of ideas which, while it succeeds admirably in destroying all independent thought among the stupid masses, drives others to the wildest extremes of revolutionary ideas in politics, literature, and philosophy."

Nijni, the site of the renowned fair, is in its decadence, although still most picturesque. Its description is worthy of perusal. It is tersely described "as a piece of mediæval Europe and unchanging Asia, with an infusion of modernity, it is unequaled even in this land of glaring contrasts."

Provincial Russia, from Moscow southward to the Crimea, is briefly treated. The great cities are lamentable spectacles, through their absence of local patriotism, local information (many large towns have no local newspaper), and owing to the corruption and brutality of local officials. The situation is perhaps best conveyed by the statement that censorship forbids the papers of a large provincial town to publish "descriptions of love scenes, criticisms on reactionary journals, the mention of trade unions, criticisms of the acts of police officials, the mention of the name of Gorky, accounts of the religion of the Japanese, praises of Tolstoi, the word 'bureaucracy,' the names of certain diseases, the enumeration of elementary schools, facts concerning the bad organization of the local hospital and the barracks, criticisms of the articles by Krushevan (the instigator of the Kishinieff massacres)."

In the Black Sea country, one of the most fertile regions of the world, with its grain, wine, iron, coal and oil, Odessa is perhaps the most remarkable port, with a population of nearly half a million. The Jewish question is treated in the description of Odessa, where the streets, promenades, and buildings are superior, owing to the large Hebrew element, about one-third of the population, which controls chiefly the business. Of the Jews, Villari says:

"The great majority are extremely poor, and engaged in various handicrafts and small trades. One of their chief grievances lies in the obstacles placed in the way of the education of their children" (limited to one-tenth the whole number of pupils).

This rule means selection and competition, which bring forward the ablest Jewish students, who "are not infrequently elected by their fellow-students as presidents of the literary and scientific societies. . . . They generally come out with the highest honors, and those who do not go into business become lawyers or doctors, the only liberal professions open to them, and rapidly acquire the best practice. The result . . . accentuates the bitterness against them on the part of the Christians."

Their unpopularity is due to many causes, principally economic. Speculation in grain, most widespread, brings them in bad standing with the peasants, who hate the Jews, but trade with them, as they often mistrust more the Christian merchants.

He adds: "In spite of their many undesirable qualities, the Russian Jews are absolutely indispensable to the welfare of the country. Without them there would be no trade, in many districts money would not circulate, and economic activity would be paralyzed."

The industrial development of Russia, stimulated by the government, has been astonishing in the past twenty years, especially in textiles and metallurgy. These industries are divided by Villari into zones: Moscow covers particularly textiles, sugar, and beer; in the Baltic iron, textiles, and ship building flourish; Poland produces textiles and tanned goods; in southern Russia the coal and iron industries are predominant; the Ural zone is given over to minerals, without coal; Baku is well known the world over for its oil productions.

These industries had a tremendous development, but overproduction and wild speculation induced equally startling collapses and bankruptcies.

Foreign employers "all have a high opinion of the skill and working powers of the *mujik* (peasant), although in other respects—sobriety, morality, education, and honesty—they regard him as far inferior to the artisan of western Europe."

Of the workmen Villari says:

"They are underpaid, ill-fed, worse housed, and are not cheap. The peasant has great industrial possibilities, is docile, quick to learn, but is without initiative, careless, and needs constant supervision."

The artisan, however, "has a new feeling of human personality and dignity," is inspired with new ideas and driven to new movements.

Confirming Wallace's opinion, Villari states that the Eastern Church is an inert body, almost devoid of vitality. It contributes little to the moral and intellectual progress of the people, but merely keeps them enslaved and ignorant. The average priest, his one thought money exaction, is grasping, avaricious, and callous to the moral condition of his flock. While the average Russian is devoted to his faith and most carefully observes its practices, yet "the liberal movement will render the absolute domination of the church a thing of the past."

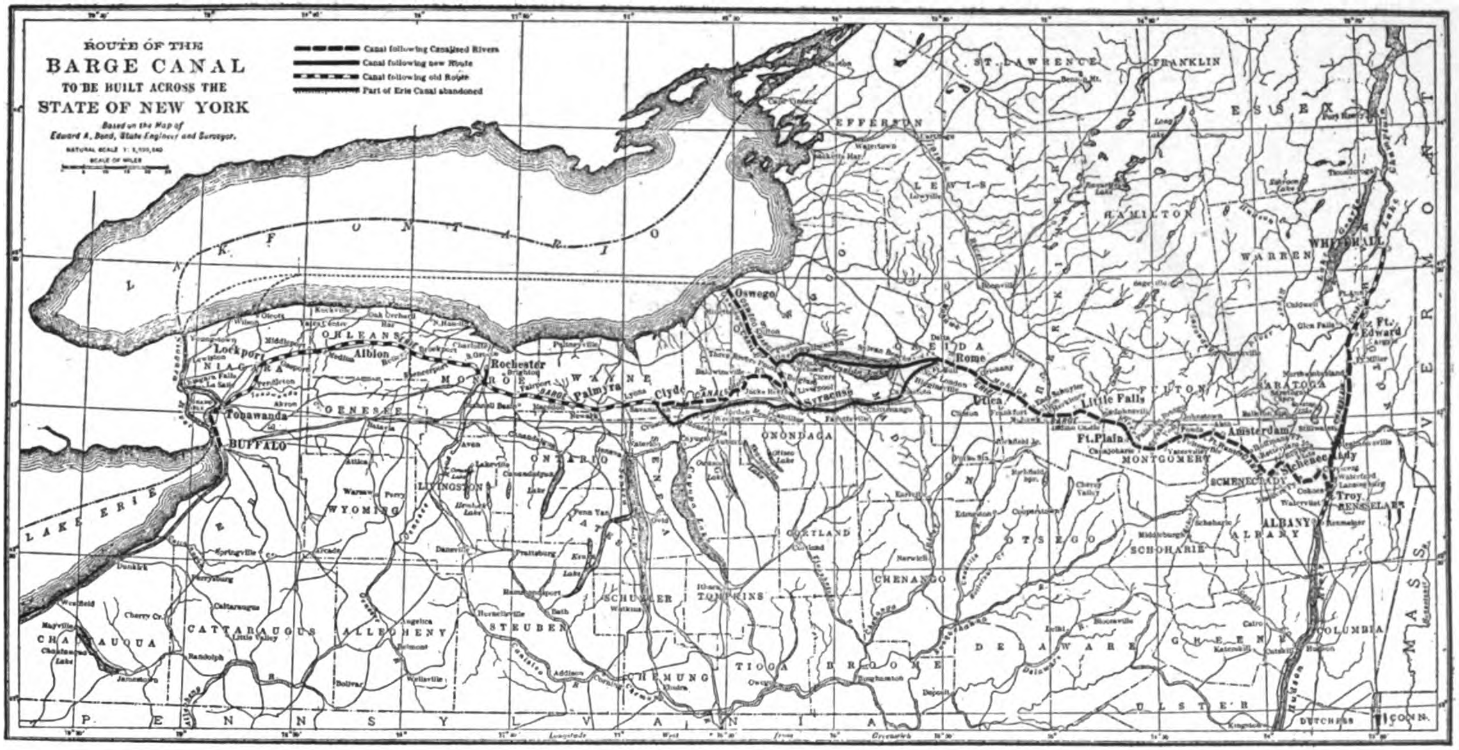
The elevation of the people is declared essential, as "until the conditions of the *mujik* are radically altered and improved, Russia can never hope to be really peaceful or prosperous."

Altogether, the volumes of Wallace and Villari are not only of current interest and value, but will continue so until the methods of Russian administration are materially improved and the rights of man are more generally recognized and respected.

THE NEW ERIE CANAL

THE new Erie Canal, to which New York is committed and which will cost more than $100,000,000, is by far the greatest work ever undertaken by any state. The canal is overshadowed in the public mind by the Panama Canal on account of the international character and the interesting complications that have attended the inauguration of that work by the United States, but in commercial importance the Erie is in many ways the equal of the Panama Canal. The canal is described in the report of the Smithsonian Institution for 1904, just published, by Col. Thomas W. Symons, U. S. A., who was so largely instrumental in preparing the plans. On the Panama it is hoped some time to reach a tonnage of 10,000,000; on the Erie all works, structures, water supply, etc., are predicted on a tonnage of 10,000,000, and provisions are made for accommodating at slight additional expense a tonnage greatly in excess of this. On the upper Great Lakes there is a water-borne commerce of very nearly 90,000,000 tons per year. The Erie Canal will furnish the cheapest route for connecting this vast lake commerce with the seaboard, and its wide-reaching influence can hardly be conceived or appreciated except by those who have given years of study to the problem.

In magnitude the work that New York has undertaken exceeds the work at Panama. More earth and rock must be excavated, more masonry used, and


ROUTE OF THE
BARGE CANAL
TO BE BUILT ACROSS THE
STATE OF NEW YORK
Based on the Map of
Edward A. Bond, State Engineer and Surveyor.
NATURAL SCALE 1: 1,000,000
SCALE OF MILES
Canal following Canalized Rivers
Canal following new Route
Canal following old Route
Part of Erie Canal abandoned
LAKE ONTARIO
LAKE ERIE
BUFFALO
Tonawanda
Lockport
Albion
Rochester
Palmyra
Clyde
Oswego
Syracuse
Rome
Utica
Little Falls
Ft. Plain
Amsterdam
Schenectady
Troy
ALBANY
Ft. Edward
WHITEHALL
Lake Champlain
Hudson
NIAGARA
ORLEANS
MONROE
WAYNE
GENESEE
WYOMING
LIVINGSTON
ONTARIO
ONONDAGA
OSWEGO
ONEIDA
HERKIMER
MONTGOMERY
FULTON
SARATOGA
SCHENECTADY
RENSSELAER
WASHINGTON
WARREN
HAMILTON
ESSEX
FRANKLIN
ST. LAWRENCE
JEFFERSON
LEWIS
CHAUTAUQUA
CATTARAUGUS
ALLEGHENY
STEUBEN
SCHUYLER
CHEMUNG
TOMPKINS
TIOGA
CORTLAND
BROOME
CHENANGO
OTSEGO
DELAWARE
SCHOHARIE
GREENE
COLUMBIA
ULSTER
DUTCHESS
PENNSYLVANIA
VERMONT
MASS.
CONN.

Map showing Route of New Erie Canal

more dams built. The cost per unit is not nearly so high as at Panama, because the work will be done in the temperate zone, where labor, tools, and materials are abundant and reasonably cheap.

The canal will be located, wherever possible, in streams and lakes, and it will have no towpath. This will reduce the cost of maintenance enormously, for the cost of keeping the towpath in order is the heaviest item of expense of the present canal.

The existing canals may be called "hillside" canals, as they go through the open country and along the upper portions of the valleys above the rivers, from which they religiously keep away to the greatest extent possible. The new and greater canal is put in the valley bottoms and in the water courses and lakes wherever practicable. It is interesting to note that the new canal is to follow the water route across the state of New York used by the pioneer settlers of the western portion of the state a century ago.

ANNUAL DINNER OF THE NATIONAL GEOGRAPHIC SOCIETY

THE annual dinner of the National Geographic Society will be held at the New Willard Hotel in Washington, D. C., on December 20. The Secretary of War, Hon. William H. Taft, and Mrs. Taft will be the guests of honor of the Society, and there will be a number of other invited guests, including Messrs W. S. Champ, Anthony Fiala, and W. J. Peters, of the Ziegler North Polar Expedition. The dinner will begin at 7 p. m., and at its close several brief toasts will be given. The president of the National Geographic Society, Dr Willis L. Moore, will preside.

It is hoped that many of the members of the National Geographic Society who live not far from the national capital may be able to attend the dinner. The Society, with 1905, completes its eighteenth year. It has now a handsome home and a substantial membership of 10,000 persons, and is in fact the largest geographical organization in the world.

On another page is pasted a blank form which members who can attend the dinner are requested to fill out and mail to the Society. Members may invite their friends to attend as their personal guests. The price per plate is $5 for members or their guests.

AUSTRALIA'S FUTURE

IN his budget speech in the Federal House of Representatives the other day, Sir John Forrest, Minister of Finance, took a very hopeful view of the future of the Australian commonwealth, in spite of the fact that the total government revenue of $57,300,000 was $545,000 below the estimate.

Sir John pointed out that though the population was only 5,000,000, Australia had since 1852 raised gold and other minerals to the value of $3,055,000,000, an average of nearly $59,000,000 yearly. In the single year 1904 the gold yield was $80,000,000, and that of other minerals was $40,000,000. Acres under cultivation numbered 12,000,000, with exports of wheat $26,250,000, of butter $12,500,000, and of wool $85,000,000. The foreign commerce for the year was $472,500,000, of which 74 per cent was with Great Britain and British possessions. The ordinary banks held $480,000,000 deposits, $107,500,000 of coin and bullion, with $175,000,000 also on deposit in the savings banks. The shipping tonnage which entered Australian harbors during the year totaled 29,000,000 tons (Sir John did not mention American ships). Most of these figures are record-breakers. The external trade exceeds that of Denmark, Norway, Sweden, Switzerland, Spain, Portugal, or Japan individually.

The production from primary industries, including manufactures, exceeds $600,000,000 a year.

The $545,000 loss in revenue was more than covered by the $900,000 shrinkage in customs and excises. Evidently Australia, like Canada, is losing by her tariff preferential in favor of Great Britain.

The total expense to Australia of federation for the year was $1,485,000, or 34 cents per capita of the population. That is just for running the federation machine.

The minister advises the taking over by the federal government of all the state debts, aggregating the enormous (for so few people) sum of $1,170,000,000, or $275,000,000 more than the United States interest-bearing debt. At first sight that looks like a big burden for the federal government to assume, but with the taking over of the debts the federal government would not have to continue the present unwieldy plan of returning the revenues over and above expenses to the various states. The sum of $35,705,000 was so returned last year. Further, any federal government, to be able to do its best for its constituents, should have entire control of the national finances. Moreover, a strong centralized government can borrow money at cheaper rates than can individual states. Recent chronicles in the English papers show how much easier it was for Japan and other centralized governments to borrow money in London and Europe than those Australian states which were seeking loans. Neither of those states has enough people, nor is the sparse population sufficiently evenly divided, to enable them to stand alone. That is the main reason why the total debts of the various states, $1,485,000,000, is $297 per capita of the total population.

It would seem as if what the commonwealth of Australia needs is less states' rights, less labor and other class government, less politics for men and more for country, more centralization in and wider powers to the federal government, before she can draw what is her greatest need—more people. Just as in the United States, get the people there, and all else follows—money for developing dormant resources, money for building up manufactures, money for railways, steam and electric, and money for building operations. When the people are there they must be fed, clothed, and housed. That means work, and it is by work, and work alone, that nations are built up into prosperity.

WALTER J. BALLARD.

THE WORLD'S PRODUCTION OF GOLD*

IT is not alone to the raisers of grain that nature has been bountiful of late. The mines of the world have been yielding treasure as lavishly as have our fields. In every day of this year, 1905, work days and feast days, holidays and Sundays, there will be drawn from the ground a million dollars of new gold. And then, when the total is finally cast up, there will be a number of odd millions to spare above that average. The mines of the world will produce this year $375,000,000 of gold. The final figures for the production of gold in 1904 have recently been made, and they footed $347,000,000. We may reasonably look forward in the near future to an annual average output of $400,000,000 of new gold for at least a considerable number of years.

When we remember that in 1885 the production of gold was but $115,000,000 we begin to get a comprehensive view of the significance of this increase. When we remember further that the entire monetary stock of gold in the world is about $5,700,000,000, we can calculate that the output from the mines in the next fourteen years promises to equal a total as great as the present monetary stock of gold. These figures are startling. They perhaps suggest the possibility of a disturbance of values. It does not follow, of course, that with the production of $400,000,000 of gold per annum the monetary stocks will be increased by that amount. The uses of gold in the domestic arts draw off at least $75,000,000 a year, but that will leave over $300,000,000 a year to add to the gold reserves.

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* From an address to the American Bankers' Convention, by F. A. Vanderlip, October 11, 1905.

While there will undoubtedly be a tendency to advance prices as a result of this influx of gold into the bank reserves of the world, I do not believe the gold production is likely to become a serious menace. I do not believe that it will so disturb those business relations that are based upon the terms of money as to cause any vital derangement of affairs.

What I do believe is that there is likely to follow just what followed in the two former periods of the world's history when there was an extraordinary production of gold added to the monetary stocks. One of these periods followed the discovery of America, when the treasures of Mexico and Peru were exploited. The other was in the years following the discovery of gold in California and Australia. In each case a mighty impulse was given to the exploitation of virgin fields of development.

It seems to me not improbable that the next few years will witness the expansion of the field of commercial enterprise into new places. Countries that are commercially and industriously backward will yield to this new influence. It seems to me that one of the direct and important effects of this great production of gold will be to give an impulse to the development and industrial exploitation of South America, Africa, Asia, and eastern Europe. At our own hand is South America on one side and China and Japan on the other. We are rapidly awakening to the commercial possibilities within these countries.

CHINA IS NOT OVERPOPULATED

OUR minister to Peking, Mr W. W. Rockhill, shares the view of Admiral C. E. Clark, published in this Magazine in June, 1905 (page 306), that the population of China is greatly exaggerated. The last official estimate, that of 1885, which was made by the Chinese board of revenue, gave 377,636,198 as the population of the Empire. Mr Rockhill believes that the population does not exceed 275,000,000 at the present time, and that probably it falls considerably below this figure.* He vouches for the fact that none of the northern provinces are overpopulated, and he is inclined to think that China could support a much larger population than it now has, which would be impossible if the number had reached the enormous figure given by some imaginative writers.

An Observer in the Philippines, or Life in Our New Possessions. By John Bancroft Devins. Illustrated. Pp. 416. Boston, New York, Chicago: American Tract Society, 1905.

The Philippine Islands. By Fred. W. Atkinson. Illustrated. 8vo, pp. 426. Boston: Ginn & Co., 1905.

Our Philippine Problem. By Henry Parker Willis. 8vo, pp. 478. New York: Henry Holt & Co., 1905.

There has been a vast deal written about the Philippine Islands in the past five years, much of which is wrong and some of which is false. Contradictory statements abound, and the plain reader is at his wits end to know what to accept and what to reject. Dr Devins, the editor of the New York *Observer*, spent two months in the Archipelago. It was long enough to learn the situation, but by no means long enough to understand it. The book is largely narrative, describing with interesting detail life on an army transport, on which the author crossed the Pacific, and several trips made about the Archipelago. The characteristics of the people, their industries, institutions, health, etc., are touched upon. Naturally, much space is devoted to matters of religion, and the Protestant missionary work receives great attention. The author is optimistic, and has written a very readable book.

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* Report of Secretary of Smithsonian Institution for 1904, page 675.

Quite different is the character of Dr Atkinson's book from that of Dr Devins. Dr Atkinson was the first superintendent of schools of the Archipelago under the American civil government, and the present admirable school system is mainly his work. He was in the Archipelago nearly two and a half years; his work took him everywhere and among all classes of people, so that he has written from a full knowledge of his subject, with authority and generally with accuracy.

His introduction is a most admirable summary of the character of the people and the necessities of the situation—the several chapters treat of topography, history, climate, health, industries, and commerce, the city of Manila, the people, their superstitions and religion, government and education. He is not clear or definite in his account of temperature at Manila (pp. 125 and 126), so that the reader may easily be confused. On pages 174 and 175 he contrasts the yield of sugar in the Philippines with that in Hawaii as follows: "A (Hawaiian) planter usually obtains 75 tons of sugar to the acre, whereas in the Philippines one (the Filipino) considers half a ton a fair amount." If he would substitute 4 for 75, and 1 for ½, the contrast would be correct and would still be sufficiently startling. There are numerous other slight errors scattered through the book which leads one to regret that the author had not awaited the appearance of the Census report and thus have avoided the slight blemishes on what is otherwise a most valuable work.

Mr Willis' book is of a still different class. The author, a professor in Washington and Lee University, devoted several months of 1904 to a study of the conditions of the Philippines. The book, like many others, is a discussion of the government and the political, social, and economic conditions of the islands.

It is not easy to take the writer seriously. He says we are in the Philippines to exploit them; that the people are antagonistic to us; that the existence of ladronism shows that the insurrection is still going on; that the press is muzzled and that speakers are not allowed to speak; that the natives prefer church schools to public schools; that the teaching of English is a mistake and that the teaching should be in the Malay tongues; that the Philippine civil service is a farce; that the native constabulary is rotten, and that the Philippine Commission favors the regular Catholics rather than the Aglipayans. Not one of these statements, it is unnecessary to say, is correct. Mr Willis was probably filled with tales of woe by some American trader who had been disappointed in his hopes of great profits by the withdrawal of the army. There are many such in the Philippines.

H. G.

Michigan. By Thomas McIntyre Cooley. With map. Pp. 410. 5 x 7½ inches. Boston: Houghton, Mifflin & Co. 1905. $1.10 net.

This is one of the best of the "American Commonwealth" series, published by Messrs Houghton, Mifflin & Co. The author realizes, what some historians are apt to forget, the important influence of the natural resources of a state. In his history he gives not merely a record of Michigan's governors and legislatures and their acts, but he describes the development of the material wealth and prosperity of the state. The census of 1900 shows Michigan ninth among the states in population, in amount of capital employed in manufactures, and in the production of flour; second in lumber, copper, and iron ore; sixth in the manufacture of agricultural implements and chemicals, and seventh in railway cars; eighth in the production of cheese and of wood-pulp and paper; tenth in manufactures generally, and thirteenth in agriculture.

Two Bird Lovers in Mexico. By C. William Beebe. With 100 pictures from photographs by the author. Pp. 408. 6 by 8½ inches. Boston: Houghton, Mifflin & Co. 1905.

An entertaining description of nature life in Mexico. The author writes well and his account of things Mexican is novel and well worth the reading.

"As we rambled through the trenches we sometimes brushed against a mass of large golden globes, strung close together along the leafless twigs of the plant—brittle and five-sided and as light as air. They reminded one in shape somewhat of the sea-jellies (*Beroë*) which drift in the currents of the ocean. And the simile is not confined to the exterior, for within hangs a small round sac containing the tiny flat brown seeds, just as, in certain of the animal jelly-fishes, the pendulous stomach is swung. Out of curiosity I counted the seeds in one of these seed-vessels and found 253. A single branch which I brought home with 79 globes would therefore scatter some 18,000 fruit. The least touch or breath of air sets each of these many seeds vibrating within their hollow spheres, producing a sweet, sifting tinkle, comparable to nothing I have ever heard in nature."

Arizona Sketches. By Joseph A. Munk. With 100 illustrations. Pp. 230. 6 x 9½ inches. New York: The Grafton Press. 1905.

Dr Munk has given a very readable account of the territory of Arizona, which has been aptly dubbed "the scientist's paradise," for it possesses grand scenery, a salubrious climate, productive soil, rich mineral deposits, rare archæological remains, and a diversified fauna and flora. Some of the chapter headings are A Romantic Land, The Open Range, Ranch Life, The Round-up, A Model Ranch, Some Desert Plants, Hooker's Hot Springs, Cañon Echoes, The Meteorite Mountain, The Cliff Dwellers, The Moqui Indians, A Fine Climate. The illustrations are particularly good.

Cram's Atlas of the Dominion of Canada and of the World. Edited by Dr Eugene Murray - Aaron, 14 x 18½ inches. Chicago: George F. Cram; Toronto: The Arnt-Gill Co. 1905.

This new atlas of Canada should prove useful to the many who are interested in the recent rapid material progress of Canada and in the new trans-Canadian railway. The maps are on a large scale and clearly printed, the statistics are the latest available, and the text contains a good summary of the history and resources of each province of the Dominion.

The Bontoc Igorot. By A. E. Jenks. Pp. 266. 7½ x 10½ inches. With 160 full-page plates. Manila: Ethnological Survey Publications. Vol. I. 1905.

The author of this volume and his wife lived for five months in the pueblo of the Bontoc Igorots, who are a primitive mountain tribe of Luzon. His description of the people is made especially valuable by the large number of excellent photographs accompanying the report. The Bontoc Igorots are an exceedingly dirty people, not 5 per cent of them being free of skin sores, but otherwise Mr Jenks has nothing but good to say of them. He found them honest, of kindly and likable disposition, courageous, industrious, and willing to learn. The Ethnological Survey is doing good work in studying the primitive inhabitants of the Philippine Islands. A previous report on "The Negritos" was noticed in this magazine several months ago.

Report of the Smithsonian Institution for 1904. Pp. 800. 6 x 9 inches. Illustrated. Washington: Government Printing Office. 1905.

The Report of the Smithsonian Institution for 1904 contains papers of geographic value, as follows:

On Mountains and Mankind. Douglas W. Freshfield.

Morocco. Theobald Fischer.

The Work of the Reclamation Service. F. H. Newell.

The Yuma Reclamation Project. J. B. Lippincott.

The Pearl Fisheries of Ceylon. Prof. W. A. Herdman.

Flying Fish and Their Habits. Dr Theodore Gill.

An Inquiry Into the Population of China. W. W. Rockhill.

The Economic Conquest of Africa by the Railroads. A. Fock.

The Present Aspects of the Panama Canal. William H. Burr.

The Sanitation of the Isthmian Canal Zone. W. C. Gorgas.

The Projected New Barge Canal of the State of New York. Col. Thomas W. Symons.

Archæology of the Pueblo Region. Edgar L. Hewett.

NATIONAL GEOGRAPHIC SOCIETY

THE annual dinner will be on December 20. For special announcement see page 569.

THE POPULAR COURSE

The addresses in this course are delivered in the National Rifles Armory, 920 G street, at 8 p. m.

December 8—"What Shall be Done with the Yosemite Valley." By Mr William E. Curtis. Illustrated.

The Yosemite Valley has been receded to the federal government by act of the California legislature, but has not yet been formally accepted by Congress.

December 22—"An Attempt at an Interpretation of Japanese Character." By Hon. Eki Hioki, First Secretary of the Japanese Legation.

December 23 (Saturday)—"A Military Observer in Manchuria." By Major Joseph Kuhn, U. S. A. Illustrated.

January 5—"Russia and the Russian People." By Mr Melville E. Stone, General Manager of the Associated Press.

January 19—"Railway Rates." By Hon. Martin A. Knapp, President of the Interstate Commerce Commission.

January 25 (Thursday)—"The Ziegler Polar Expedition of 1903–1905." By Messrs W. S. Champ, Anthony Fiala, and W. J. Peters.

A novel feature of this meeting will be the exhibition of moving pictures of Arctic scenes.

February 2—"Austria Hungary." By Edwin A. Grosvenor, LL. D., Professor of International Law in Amherst College, author of "Constantinople," "Contemporary History," etc.

February 10 (Saturday)—"A Flamingo City." By Dr Frank M. Chapman, American Museum of Natural History.

February 16—"Africa from Sea to Center." By Mr Herbert L. Bridgman. Illustrated.

Africa in transition today challenges the attention of the world. Few intelligent Americans know to what extent its possibilities have been developed since Livingstone's day, a development that in rapidity promises to exceed that of North America.

February 20 (Tuesday)—"China." By Hon. Charles Denby, of the State Department.

February 23—"The Personal Washington." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

This is not a lecture in the ordinary sense of the word, but it is an exhibition, through the medium of the stereopticon, of the greatest collection of prints, manuscripts, and letters referring to the personal side of Washington ever brought together.

March 2—"Our Immigrants: Where They Come from, What They Are, and What They Do After They Get Here." By Hon. F. P. Sargent, U. S. Commissioner General of Immigration. Illustrated.

March 16—"Oriental Markets and Market Places." By Hon. O. P. Austin, Chief U. S. Bureau of Statistics. Illustrated.

March 30—It is hoped that official business will permit the Secretary of the Navy, Honorable Charles J. Bonaparte, to address the Society on "The American Navy."

April 13—"The Regeneration of Korea by Japan." By Mr George Kennan. Illustrated.

SCIENTIFIC MEETINGS

The meetings of this course are held at the home of the Society, Hubbard Memorial Hall, Sixteenth and M streets, at 8 p. m.

December 12 (Tuesday)—"Norway as it is." By a Norwegian, Rev. B. E. Bergesen.

December 15—"Surveying our Coasts and Harbors." By Hon. O. H. Tittmann, Superintendent U. S. Coast and Geodetic Survey.

December 29—"Problems for Geographical Research." By Gen. A. W. Greely, U. S. A.

"The Binding Power of Road Material." By Mr A. S. Cushman.

January 12—Annual meeting. Reports and elections. "Progress in the Reclamation of the West." By Mr F. H. Newell, Chief Engineer Reclamation Service.

January 26—"The Carnegie Institution." By President R. S. Woodward.

February 9—"The Introduction of Foreign Plants." By Mr David G. Fairchild, Agricultural Explorer, U. S. Department of Agriculture.

February 24 (Saturday)—"Hunting with the Camera." By Hon. George Shiras, Member of Congress from 3d District, Pennsylvania.

March 9—"The United States Bureau of the Census." By Hon. S. N. D. North, Director.

March 23—"The Death Valley." By Mr Robert H. Chapman, U. S. Geological Survey.

April 6—"The Total Eclipse of the Sun, July, 1905, as Observed in Spain." By Rear Admiral Colby M. Chester, U. S. N., Superintendent U. S. Naval Observatory.

April 20—"The Protection of the United States Against Invasion by Disease." By Dr Walter Wyman, Surgeon-General Marine Hospital Service.

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Soft Hats, $2.00 to $5.50 **Silk Hats, $5.50 to $7.00**
Stiff Hats, $2.00 to $5.00 **Opera Hats, $6.50**

The makers represented here are the best in their line, and their hats are as good as can be made for the price.

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